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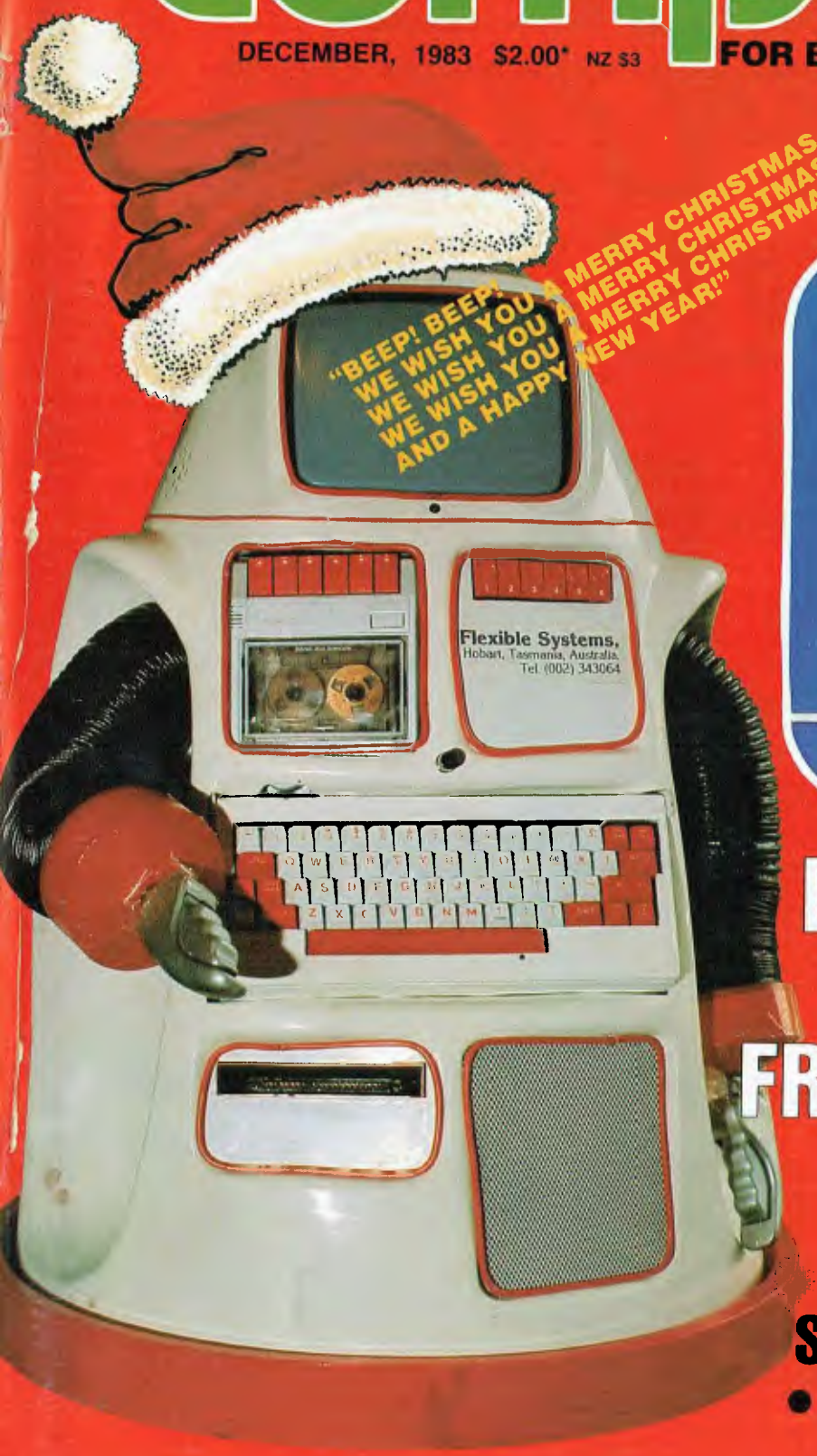

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inside your computer

Vol. 3, No. 5,
December, 1983

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High-Tech On Australia II
You may not automatically associate the America's Cup with computers, but on board Australia II were several powerful machines that helped her bring home the trophy. Evan McHugh reports on them.

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Elami – Your Friendly Robot
Robots in your home could well be closer than you think; several companies are developing mechanical 'friends', using either your own computer or a computer on-board to drive them. Tom Moffat writes about Elami, a soon-to-be-born Australian robot.

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Publishing Your Software
We've had several enquiries from readers wanting to know how to go about getting their software published, so Natalie Filatoff found out for us.

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Buying Your Child A Computer For Christmas
At this time of the year many parents who know nothing at all about computers are being pestered by their offspring to "buy me one for Christmas". Helen Burnett has some advice for you: what it'll cost you, what's involved other than 'the computer' itself, the benefits to your children ... and more.

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Your Computer Questionnaire
In our light-hearted Christmas questionnaire, Derek Morris helps you find out whether you'll ever make it to the top of the computing ladder.

YBC
Your Business Computer
This issue features the second part of Frank Liebeskind's article on 'Micros in a Mainframe World', plus several software and hardware reviews of business-oriented products.

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Your Computer News
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Should You Buy An Orphan Computer?
An 'orphan' computer is one which, for some reason, has been abandoned by its manufacturer. Is there ever a good reason for buying one? Eric Lindsay discusses the question.

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Innocent In Computerland
Lesley Zolin belongs to one of the classes least likely to become involved with computers – she's middle-aged, married, innumerate – and, of course, female. Despite all that, she's having great fun learning to operate her Commodore 64.

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Microbee Graphics - Part 2
More words of wisdom from Mike Oborn on getting the most out of your Microbee's graphics capabilities.

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Word Games With The Word
Jeff Richards has found yet another useful application for 'The Word' software, reviewed by Les Bell in our October issue – one particularly useful for playing word games.

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System Expansion - Part 1
'The when and how of adding things on' – before you start adding that printer/plotter/disk drive/modem to your computer, just how much do you know about your machine's requirements? Roy Hill gives a few hints.

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Undeleting Apple Files
Ask any computing hack what his/her worst nightmare is, and most will say, "Deleting a file by accident." Keith Jeeves brings the welcome news that, for Apple users at least, the mistake is reversible.

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Sound For The Sinclair
Benjamin Smith has found a way, without any hardware modification at all, to add the capability of sound to the Sinclair ZX81.

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Don't Panik!
'Panik' was rated among the Top Five games programs for the TRS-80 a very short time after its release in the USA. Eduardas Grigonis tells us why.

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Book Reviews
Eric Lindsay reviews several computer books – hardware, software, even fantasy.

High-Tech On Australia II
Evan McHugh went looking for the technical reasons behind Australia II's stupendous win in the America's Cup – and came up with a list of computers and facilities that would keep any million-dollar business happy.

Bits Missing
Les Bell has been caught up in the Christmas rush, and didn't manage to get his Assembler, dBase and Logic tutorials to us this month in time for publication. A big 'sorry' to all those readers who follow his pearls of wisdom with bated breath in every issue, but Les will be back with revitalised New Year vigour in our January issue.

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Your letters to *Your Computer* – let us know what we're doing right (or wrong), ask other readers for help, air your pet whinge – just write to us.

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editorial

The world is changing, even as we sit here talking about it. Recent developments in the US indicate tremendous growth in the field of artificial intelligence, which will have profound significance in the world of personal computing.

Recently released software from Texas Instruments, called NaturalLink, uses the personal computer as an aid to the tyro user of the Dow Jones News/Retrieval Service (see, I do think TI can do something right).

NaturalLink splits the screen into two windows, each containing a list of words or phrases for a portion of a command. The user simply scrolls to one of the options and hits the return key to make his or her selection. Based on this command, the next set of options is chosen. Gradually a plain English sentence is built.

In tests, users began to use NaturalLink successfully within 30 minutes, even without a manual.

TI also recently demonstrated some remarkable speech recognition and generation capabilities for the TI Professional Computer. Clearly, they are working to link these two products together. The result will be a much smarter user interface than we have hitherto seen.

The question this raises is very obvious. How do you hackers (I'm including myself here, too), who just spent a couple of years mastering TRS-DOS or CP/M or whatever, feel now? When you can just talk to a computer?

Apple's Lisa half scared me to death; for a technical writer a machine with no technicalities makes poor material. This stuff is even worse. It may not pass the Turing test, but it's getting closer.

Oh well, it could be worse. We could be COBOL programmers ...

- Les Bell

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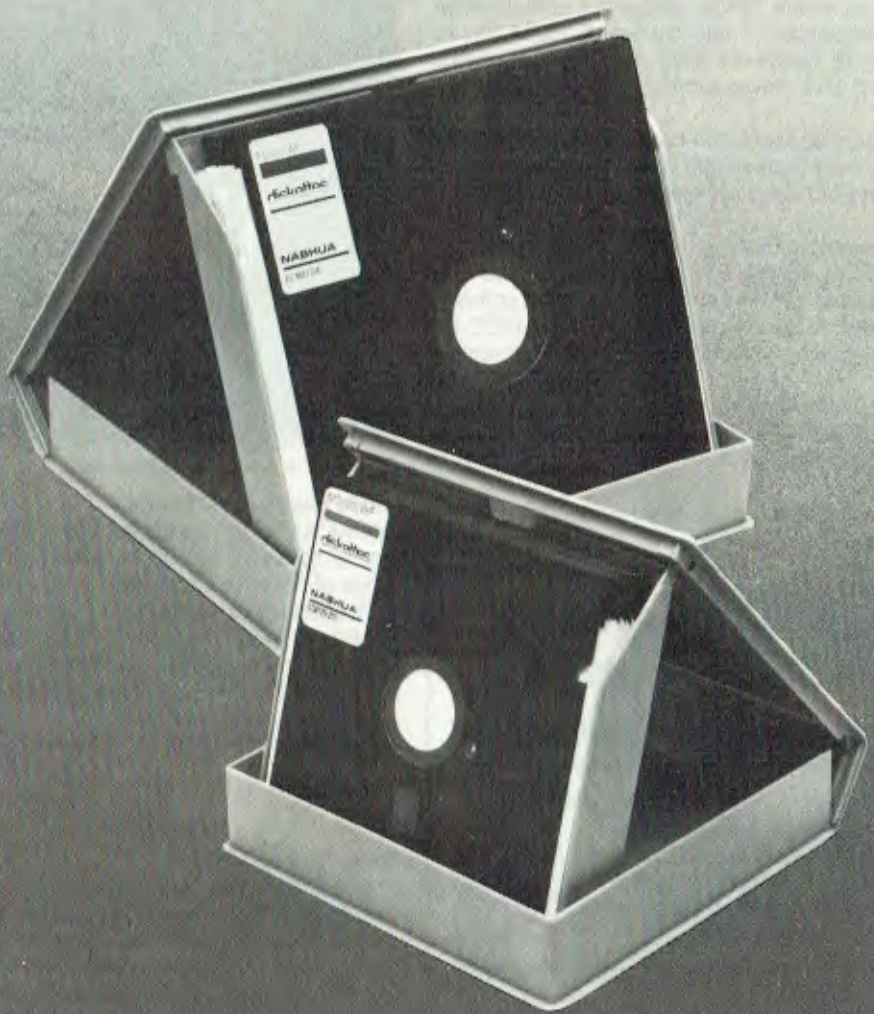

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your computer news

IBM Goes Nuts

IBM HAS FINALLY officially announced its entry into the home computer market with the 'Junior' or 'Peanut', as it's expected to be called. It will be available in two models, the 'Basic' and 'Enhanced' versions, expected to retail for around $669 and $1239 respectively.

The basic version is said to be based on an Intel 8088 chip and have 64K RAM, of which 16K is dedicated screen RAM, leaving 48K user-addressable. It will have 64K ROM, an infrared keyboard with 62 typewriter keys; two ROM cartridge slots; ports for printer, disk drive, modem and joysticks; and a transformer.

The enhanced version is also 8088-based, with 128K RAM, 64K ROM, built-in 13 cm half-height disk drive with 360K capacity, and the same I/O and keyboard specifications as the basic version.

Software for the Peanut/Junior will run on the IBM-PC and XT, but existing software for the PC will not run on the new machines without modification. In future, however, all software for the IBM-PC, XT and Junior/Peanut will run under DOS 2.1 and the line will be software-compatible (except for memory constraints).

Software available at the time of the launch included 'Easy Writer 1.5', 'PFS:File' and 'Report', Microsoft BASIC, Logo, DOS 2.1, 'Home Budgeting Jnr', 'Time Manager', and a number of games.

IBM hasn't yet announced when its new home computer will be available in Australia. ❑

Sharp Family Computer

THE SHARP CORPORATION of Australia has entered the growing home computer market with its MZ 700 series.

The MZ721 is a computer designed for family use, with a full-sized keyboard, four-direction cursor control keys and seven programmable function keys. It has an integrated data cassette recorder to facilitate easy program loading and storage of information, and three display outputs, allowing it to be connected to a colour television, a composite video monitor or an RGB colour mid-resolution computer monitor.

The Sharp MZ721 uses a high-speed Z-80 central processor running at 3.5 MHz, and has 64K of RAM. An integrated four-colour plotter/printer is an optional addition.

The recommended retail price for the MZ721 is $499. Sharp is releasing this family computer with a special introductory offer of five free games programs with every machine purchased. For further information, contact John Roubicek on (02) 233 2322. ❑

Datacraft's 'Little Black Books'.

Little Black Box Books

DATACRAFT has released the Black Box Catalog, which offers a series of reference books providing information on a range of data communication subjects.

The titles listed in the catalogue include 'Data Communications Facilities', 'Networks and Systems Design', 'Practical Aspects of Data Communications', 'Data Communications for Microcomputers', 'Data Transmission' and 'McGraw Hill's Compilation of Data Communication Standards'.

For further information, contact David Anderson on (03) 726 9911. ❑

User Group Listing

THE LIST of User Groups throughout Australia that we promised for this issue won't now appear until January, largely because we're still getting news of new groups as we go to press. Rather than publish an incomplete list, we decided to hold it up for a month in order to get the definitive version.

So if your User Group wants to be included in our listing and you haven't already written to us, make sure you get your information in the post to us *now!* ❑

Suppliers Of 'The Final Word'

SINCE running a review of the 'Final Word' word processing system in *Your Business Computer*, August 1983, we've had several enquiries on where it's available from.

As we mentioned in the September issue, you can get it by mail order from Software City, 1/27 Forge St, Blacktown 2148. (02) 621-4242.

We've since heard that Prosoft (Professional Software) is also distributing the 'Final Word', version 1.15, a release which contains enhancements and the ability to use the attributes of around 50 different printers. Prosoft also runs a software updating service to keep its users in step with the market.

You can contact Prosoft at Suite 403, 450 Lt. Collins St, Melbourne 3000. (03) 67-9098. ❑

THE AFFORDABLE HIGH PERFORMANCE PLOTTERS - FROM ROLAND.

If you've travelled overseas, then you would have heard about Roland Corporation's high-performance, low-cost, multi-pen, color plotters. Now, you won't have to travel because they are available here from Roland dealers in all States.

Roland's high performance 8 pen plotter also comes with a single pen variant (DXY101). These flatbed X-Y plotters are the most compact units of their kind and come in a portable carry case.

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Hard Disk For The Little Morrow

MORROW DESIGNS distributor Automation Statham has launched a hard-disk version of its impressive single-user CP/M machine, the Micro-Decision.

The Micro-D, as it has become known, is already one of the best-performing, value packages available. The new version, the MD11, plugs the gap in the Morrow range for the business or professional user who wants fast disk access or who maintains large files.

Morrow claims the MD11 is probably the fastest machine anywhere near its price (around $5000 before sales tax) – disk access is 10 times faster than floppy and, Morrow says, two to three times faster than other hard-disk systems that lack an integrated design.

The 13 cm hard disk has a capacity of 11 megabytes formatted, while its companion minifloppy can take 384 kilobytes.

Bundled software (included in the machine's price) has changed slightly. Instead of WordStar you now get New Word for word processing – Morrow describes it as "including the features of the most widely-used word-processing program [that is, WordStar...] as well as a special UNDO feature and a HELP key." It also includes a 'List Manager' for form letters and mailing lists. The package is said to have been written by a group of ex-MicroPro (maker of WordStar) employees, so it should be interesting.

Also on the free software list is the Correct-It spelling checker, LogiCalc spreadsheet, Personal Pearl database manager, Microsoft Basic-80, the NorthStar-compatible BaZic, and Pilot.

The MD11 has 128 kilobytes of RAM (Random Access Memory), as it runs the new CP/M-Plus (or CP/M 3) operating system which can run larger programs in bank-switched memory.

It has a Centronics parallel port and three RS-232 serial ports. The third of these can run from an onboard RS422 connector for high-speed synchronous serial communications (up to 500 K-bits a second), which makes us think there's a network in Morrow's future. Serial port speeds are software-controllable and run up to 19.2 Kbaud.

The 'baby' Morrows are all particularly user-friendly as well as versatile. A menu-driven front-end gets the first-time user up and running with no fuss, guiding him through the process of copying his master disks and giving CP/M commands. It also has a standard terminal interface which automatically configures a supplied program to match your terminal's protocol, and 'virtual disk drive' capability which allows you to assign extra drives – the operating system prompts you to put the alternate diskette into the A: drive whenever a non-existent drive is referenced. The ability to read and write multiple disk formats is another plus for Morrow.

For further information on the Morrow range contact Automation Statham at 47 Birch Street, Bankstown 2200 or phone (02) 709-4144. ❑

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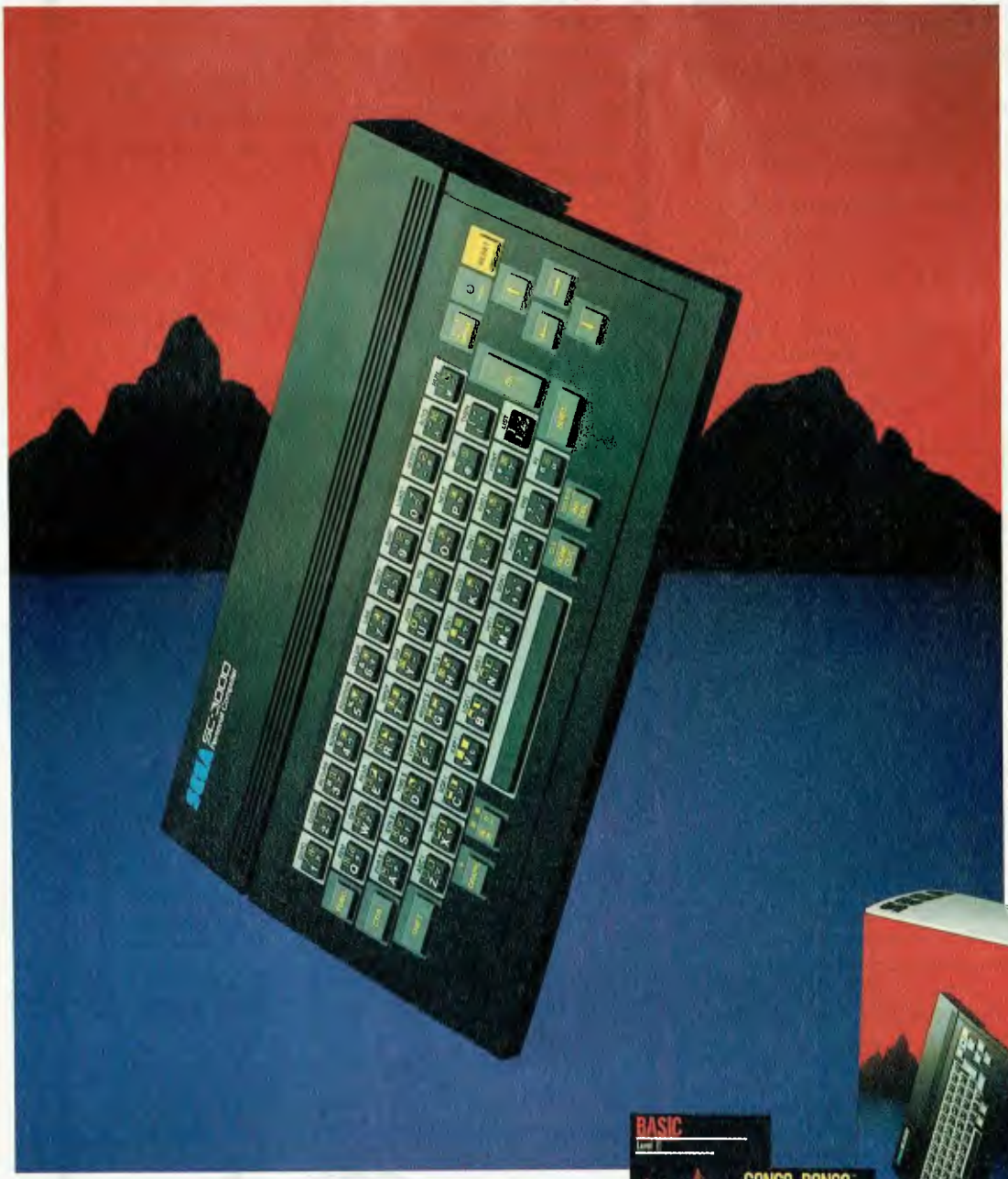

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The 'Total Solution' computer package from Control Data.

Control Data's Total Solution

CONTROL DATA has announced 'Total Solution', a computer package which includes a new microcomputer, a range of products and services needed by the micro user and the ability to 'hook' the micro into the computing power of Control Data's Cyber mainframes at its Australian Computing Centre in Victoria.

In addition, Control Data will offer customers the opportunity to rent all their microcomputing needs under one simple contract.

The microcomputer included in 'Total Solution' is the CRS-100. It comes with Control Data's touch-sensitive screen, a number of services (such as on-call maintenance and access to CDA's consultants) and a complete range of self-teach PLATO education courseware. The one-year-minimum rental contract includes a year's supply of flexible disks, ribbons and paper.

As part of the package, Control Data will conduct an initial implementation review aimed at determining the user's precise requirements. The company will install the system and provide regular maintenance and six-monthly audits to ensure that the initial requirements are still being met. A Control Data analyst/programmer will also assist the customer to implement the required software, either locally, on his new microcomputer, or through the CDA Cybernet Services network.

Although the 'Total Solution' is initially being offered in conjunction with Control Data hardware only, plans to accommodate other manufacturers' microcomputers are under way.

For further information, contact Murray Finlay, (03) 268 9500. ❑

Wang Goes Into Pics

WANG COMPUTER launched the world's first professional image computer (PIC) in Boston in early October, and intends to bring PIC demonstration units to Australia by early 1984.

Based on the Wang PC, the PIC includes: a desktop camera-like scanner, to digitise images from a sheet of paper; a high-resolution monitor, capable of displaying the image; and a desktop thermal printer, to print the image.

The PIC's image processing software permits users to scan, digitise, create, display, alter, merge with text, store, retrieve and transmit images. It can handle image information such as pictures, hand-written notes, margin notations and drawings, as well as text.

The PIC is fully integrated and compatible with Wang's VS/IIS, VS/ALLIANCE, OIS, ALLIANCE TM, and Professional Computer product lines.

For further information, contact Peter Wong, Wang Computer Pty Ltd, (02) 436 3477. ❑

Bank Robots Serve Customers

A BANK BRANCH staffed by robots, which allow customers to draw cash, check their accounts and deposit cheques and currency, was recently opened by the National Westminster Bank in Basingstoke, England.

The robot section of the bank has two high-speed cash tills, which deliver pre-set sums of money in 15 seconds. Customers operate the tills from screened booths, known officially as Account Information Service Terminals, but more colloquially as 'confessionals'. Using a keyboard, screen and the now common plastic bank service card, customers can also interrogate the system for details about their accounts. ❑

Briefly . . .

■ Roland Corporation Australia, a Melbourne-based company which holds 70 per cent of the Australian musical synthesiser market, is hitting a new note by starting a specialised division for computer peripherals. These will include a converter, 35.5 cm (14 inch) colour monitors and eight- and one-pen plotters. For further information, phone (03) 417 1800.

■ Peachtree Software Australia has announced two ranges of accounting software products for the Australian and New Zealand markets. They are the Peachtree Basic Accounting System (PBAS), and Peachtree Compact Accounting System (PCAS), both of which were developed in conjunction with Compact Software Australia. For further information, phone (02) 929 8200.

■ An Australian-designed device enabling a telephone to communicate directly with a computer is being produced in Melbourne by a new company, Interact Technology. The Miniature Enquiry Terminal (MIT), as it is called, fits over a telephone mouthpiece and operates by keypad to a computer with a decoding program and a voice modem. Tones from the MIT are decoded by the modem and relayed to the computer for action, such as order entry or requesting bank balance details. The MIT is expected to sell for around $50.

■ Nashua has announced that the 13 cm diskette specially formatted for the Digital Equipment Corporation RX50 drive is now available. The diskette is suitable for use on the Decmate, Rainbow, Micro II and Professional 325 and 350 systems. It is a single-sided 96 track per inch diskette packaged in plastic library cases. For further information, contact Nashua on (02) 925 3111.

■ Sourceware, a Sydney-based computer products distributor, has been appointed the Australian distributor for AST Research, a US supplier of add-on products for the IBM-PC. AST Research produces about 20 hardware and software accessories for the IBM-PC in three categories – communication products, multi-function memory cards and system enhancements. For further information, contact Doug Ruttan on (02) 411 5711.

■ Following Les Bell's editorial on warranties in the October issue of *Your Computer*, DEC has informed us that it provides 12 months' warranty as standard on its personal computer systems. Repairs under warranty are carried out on the customer's premises by Digital.

■ Magmedia has been appointed sole Australian distributor for the Xidex Precision flexible disk range. Specifically designed for high-density applications, these 13 cm and 20 cm disks claim the highest certification level in the industry. The head-to-disk interchange problems inherent in 96 track per inch systems are said to have been alleviated by an improved tolerance on the inside diameter of the disk's centre hole. Materials used in the manufacture of the disks are designed to resist fluctuations in temperature and humidity. For further information, contact Kevin Biggs on (02) 428 1100. ❑

"More... of the latest for

When the little Ozi Bear is on the box you can be sure you have the best in software or accessories for the VIC 20 or C64, from around the world.

Ozi Soft Expansion Board for VIC 20

Getting cartridges in and out of the VIC 20 need no longer be a struggle with the Ozi Soft. 3 slot Expansion Board. The Board allows up to 3 cartridges to run simultaneously, with switching to turn off any of the 3 catridges if they're unwanted. The reset button enables you to clear memory without turning the VIC 20 off. Made in Australia this Expansion Board is something all Vic 20 owners should have. Available from your computer dealer for only $59.95*

Ozi Soft Light Pen for VIC 20 and C 64

The first Light Pen designed and built in Australia. And adds new dimensions to home computing, making interfacing with screen graphic simple and versatile. Plus many other capabilities you should explore.
Complete with programme $39.95*

FROM RAM ELECTRONICS

16K/3K Memory Expansion.
At last a sensible memory expansion cartridge for the Vic 20 that allows you to expand your Vic by an extra 3K for programs that require an extra 3K and without having to buy an extra cartridge to 16K. All this with just a flick of the switch. A very handy cartridge to own and whats more, it costs the same as a normal 16K cartridge $69.00*

..... $99.00*

16K Memory Expansion — Vic 20.
If you require a 16K memory expansion cartridge then you cannot beat this one for price. Made in the U.K. this high quality expansion board will prove extremely good value. $69.00*

Vicsprint 64 — C64.
This product will allow those who own centronics parallel printers to interface them with the Commodore 64. It allows for true Pet to Ascii conversion and will enable the printer to print out all Commodore graphics characters, and bit mapped graphics. $119.00*

FROM TERMINAL SOFTWARE

Super Dogfight C64
As a pilot of the fabulous world war 1 biplanes two players can do battle in the sky. It's a great game with all the sportsmanship of the time $24.95*

Super Scramble VIC 20 & 64
Fabulous arcade action as you pilot your bomber over mountainous terrain seeking out enemy bases and avoiding attack. With 3

C=64, from Ozi Soft."

ships per game you have 8 sectors to master
..... C64: $24.95*/VIC 20: $19.95*

Super Gridder — C64.
A fight through the blackness of space to retrace the lines of a luminous grid. A fight against time in which skill and tactical cunning are needed to elude carnivorous scorpions. Two of the creatures pursue you through a series of eight different grids. If you can battle you way through that, prepare yourself for a third pursuer and maybe even a forth! Three lives per game and the power to create temporary holes in the grid behind you to thwart pursuit, puts you in with a fighting chance. Eight different grids, 3 speed levels.
..... $24.95*

FROM SOLAR

Munchman 64.
Munch through the maze eating the dots while avoiding four hungry ghosts. A power pill in each corner of the maze, when eaten, allows you to gobble the ghosts for a short time.
..... $19.95*

Tri Count — C64.
This is the complementary package to the trilogy series and combines a complete general ledger package with 600 account classifications, sub total abilities and report generator: accounts receivable with up to 150 accounts per disk, complete reviews and age analysis can be created: inventory control will allow up to 300 items per disk with full search and find features. This professionally integrated accounting system will efficiently run a small business at the touch of a button.

Galaxions C64.
The Galaxions have arrived from a dying planet, determined to destroy civilisation as we know it. Only you can save mankind as they swoop and dive toward you. 100% machine code.
..... $19.95*

FROM VICTORY SOFTWARE

Annihilator — C64 and Vic 20
Now the fast-paced defender style game is available for the Commodore 64. Your aim is to defend your moon base from the atttacking aliens who launch heat seeking missiles to destroy you. Using the 64's sprite graphics and excellent sound. Victory Software has managed to come up with this exciting game that will keep you going for hours. $24.95* and $19.95*

Kongo Kong — Vic 20 and C64.
This game provides hours of jumping barrels and climbing ladders. The object of the game is to climb the ladders to the top in order to reach the maiden in distress. 5 levels, with full sprite graphics on C64.
..... $19.95* and $24.95*

Metamorphosis — C64 and Vic 20.
You have stumbled into the nest of the Cyglorx and find yourself fighting off robot tanks guarding the Gyglorx eggs. You think you have everything under control and then the eggs start hatching!!!
C64 version features 4 different screens
..... $19.95*

FROM ARTWORX

Monkey Math — Atari 16K, Vic 20 8K and C64.
Monkeymath's marvellous graphics and animation couples the fun and excitement of an arcade game with the opportunity to learn and practice number placement, addition, substraction, multiplication and division. Each of these skills may be practiced at three levels of difficulty. For ages 4 to 10.
..... Cassette $29.95*

FROM ISIS HATHOR

Basm C64
Basm is a basic that thinks like an assembly language, because it uses the syntax of basic, but works like an assembler. Basm has features for both the programmer familiar with assembly language and the novice interested in making the break from basic to machine code. This can allow your programme to run up to 85 times faster. It is a complete package with well over 100 pages of information to teach you this unique language
..... $99.00*

FROM ABRASCO

Abracalc C64
One of the most common programmes in the business world is the spreadsheet. It opens the door to a simple solution to a multitude of complex problems. Set up a home budget system, do business calculations, cash flow analysis and sales forecasts etc. What if questions can get instant answers. Simple to use and comes with a comprehensive manual, with all the features of a truly professional spreadsheet programme $49.95*

FROM OZI SOFT

Underworld of Kyn C64
This great game programme has taken months to develop and Ozi Soft is proud to release it as one of the best computer adventures yet. This intelligent programme understands complete sentences and challenges you to destroy the evil powers of the Wizard of Kyn. Escape the twisted underworld of tunnels and rooms. Then avoid the perils that lie beyond. Really something for all adventure fans
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Dealer enquiries invited
Telephone (02) 29 6330

IMAGOMAT 200YC

The Commodore SX64 portable computer.

Commodore SX64 Portable Business Computer

COMMODORE BUSINESS MACHINES has released the SX64, a portable (12.5 kg) computer with 64K of random access memory, a six-inch built-in colour monitor, a detachable low-profile keyboard and a built-in floppy disk drive.

The drive has a formatted capacity of 170K and a dual drive is available as an option.

The SX64's colour screen is said to be highly legible, but for prolonged use an external port is provided for connecting the unit to a full-sized monitor. Another port connects to a graphic printer.

The new portable is compatible with VIC-20 and C64 peripherals, including the VICMODEM for telecommunications. Using a Zilog Z80 microprocessor, the system can make use of the library of business software running under the CP/M operating system. And, with a PET emulator, it can make use of much of the available PET software.

The SX64 can also use the game cartridges available to the 64 family of Commodore computers, and has full music and sound capability.

The computer's processor is an Intel 6510 and is program-compatible with the 6502. BASIC V2 is resident in the system's ROM, and the SX64 can also make use of other languages including Pascal, Logo, COMAL, Assembler and Pilot. ❑

BYTEWRITER

DAISY WHEEL PRINTER

LETTER QUALITY PRINTER AND TYPEWRITER IN ONE PACKAGE

The BYTEWRITER is a new Olivetti Praxis 35 electronic typewriter with a micro-processor controlled driver added internally.

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• Underlining • 10, 12, or 15 characters per inch switch selectable • 2nd keyboard with foreign grammar symbols switch selectable • Changeable type daisy wheel • Centronics-compatible parallel input operates with TRS-80, Apple, Osborne, IBM and others • Cartridge ribbon • Typewriter operation with nothing to disconnect • Service from any Olivetti dealer • Self test program built in.

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Phone (03) 529 7622

NEC's Spinwriter Model 2000.

New NEC Word Processing Printer

DATASCAPE has announced the release of the NEC Model 2000 Spinwriter. The Model 2000 is rated at 20 cps, prints average text at 12 pitch, and uses a range of more than 90 thimbles.

It has plug-in interfaces for RS232C, Centronics parallel, Diablo serial and IBM parallel, which means one printer can be used with a wide range of computers that may exist in one office.

The 2000 has the ability to use a large range of paper-handling options from the larger 3500 series. These include single and dual-bin sheet feeders, envelope feeder, uni- and bi-directional tractors, push tractors for demand document applications, and a single sheet guide for automatic letter insertion.

The standard Model 2000 costs $1135 (excluding tax) and interfaces range from $275 to $360. For further information, contact Rob Stirling on (02) 909 1233. ❑

Advances In Solar Power From Sanyo

SANYO JAPAN recently announced the development of 'flexible' amorton — a layered amorphous solar battery which utilises both metal and resin substrates.

In contrast to the existing glass substrate used in calculators, electronic games and watches, the flexible metal and resin film substrate types are claimed to be superior in mass production quality. They also adapt to any sort of surface, including bends and curves.

The flexible solar cells are being considered for use in curved-surface electronic products, such as headphone radios, and in products which combine energy from both solar light and solar heat. ❑

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Wico™ Trackball
The ultimate in arcade precision with built-in micro-processor that gives you 360° tracking accuracy. Two buttons for awesome firepower. Extra long 1.5 metre cord.

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WITH INTEGRATED TELEPHONE

For user installation to a standard phone socket without Telecom assistance, the new **Cicada 300T 300-Baud data modem** features fully integrated phone for maximum convenience. With all the legendary performance and reliability of the standard Cicada 300.

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Specifications (Both modems): Compact answer-and-originate units for direct connection to phone lines and for computer interface utilising either RS232C or V24/28 systems. Unit measures 203mm x 152mm x 63.5mm. Telecom approval number C83/37/1011.

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Dick Smith's new 'Challenger' microcomputer.

Dick Challenges IBM

DICK SMITH ELECTRONICS will soon announce its launch into the small business computer market with a product designed to compete with the IBM-PC.

The new machine is a UK-built, 16-bit IBM lookalike, made by Advanced Technology and appropriately named 'Challenger'. Its main features are an Intel 8088 microprocessor with 128K memory expandable to 256K, and 760K double-sided double-density slimline floppy disks, with hard disk option.

Although the price of the Challenger has not yet been announced, it will rival that of the IBM-PC and include bundled Perfect Writer, Perfect Filer, and PerfectCalc software packages. With its expanded memory, it can run other spreadsheet applications such as VisiCalc.

Distribution of the Challenger through Dick Smith retail outlets should begin in January, and selected Woolworths Big W stores may also take the opportunity to begin computer retailing. (Last year, Woolworths acquired a majority shareholding in the Dick Smith Electronics chain.)

For further information, contact Dick Smith Electronics on (02) 888-3200. ❑

US$ Price Parity Policy

DICKER DATA PROJECTS, the Australian distributor for Vector Graphic Inc, has a policy whereby its customers can purchase Vector Graphic products at the same price as they could in the United States. Only duty and freight charges are added.

The company claims that the customer support, training and service it can supply with each system purchased far outweighs any perceived benefits of purchasing a system overseas.

Prices start from a little over $4000 for the Vector 4/10, a 630K single floppy disk system with 128K RAM standard, expandable to 256K.

Included in the purchase of most Vector 4 systems is software valued at $2626, with programs such as Memorite III (word processing), Execuplan II (financial planning), GSX graphics, CP/M and CP/M86 and Advanced Programmers, which includes SCOPE, RAID and BASIC. ❑

Computer-User-Friendly Credit Unions

IF YOU'VE been salivating outside the computer shop, dreaming in high-res graphics, always painfully aware of the emptiness of your pocket, the Association of New South Wales Credit Unions informs us they'd be only too pleased to help.

Apparently many people are unaware that credit unions are one of the financial institutions willing to lend on home computers. They claim to have attractive interest rates, no penalty for early loan repayment and no extra charges, such as establishment fees and administrative fees. So you can stop drooling – the Association's information hotline – (02) 745 3111 – can give details of a credit union near you. ❑

EPROM-Based Microbee Toolkit

HOBART ELECTRONICS company High-Tech Tasmania has released a new Microbee software package in EPROM (Erasable Programmable Read-Only Memory). The 4K package, containing eleven programs, was written by Tom Moffat, a software author well-known to Microbee users.

Although any of the programs can be called from BASIC, most of the package has been directed at machine code programmers. Included is a debugging routine that freezes a program in mid-run and displays the contents of all the Z80's registers.

There is also a memory dump facility that provides a hexadecimal listing of any memory area to both the screen and printer; and a program called 'BASCON' provides on-screen conversions among the decimal, hex and binary number bases, a task that's usually done from tables in a book.

The largest program in the package, occupying just under half the EPROM, is a disassembler that converts pure machine code into human-readable assembly language. It can also display the meaning of ASCII-coded data sections of a program. The disassembler allows a user to study the workings of any machine language program, including the latest high-speed games.

For the ultimate games study, a program called 'SCRDMP', when called from within a program, provides an exact copy of the Microbee's screen to a C. Itoh printer – graphics and all.

For those who use the Microbee's editor/assembler as a word processor, there are some programs to make the task easier: 'MANU' sends control codes to a C. Itoh printer, 'WORDS' provides a count of the words written into the EDASM's primary file, and there's also a program to initialise the Microbee for use with a parallel printer. The Microbee does not do this itself except under BASIC.

Finally, three programs represent a 'best of Tom Moffat' collection: the popular radioteletype decoding program, the facsimile 'picture plucker' program, and the Microbee audio frequency counter.

Presented individually, the memory for the eleven programs would run to much more than 4K. The space saving is achieved by sharing subroutines among several programs.

The package is available in a type 2532 EPROM for both the standard (2 MHz) Microbee and the IC model (3.375 MHz). The cost, including postage and full instructions, is $50. Inquiries should be sent to High-Tech Tasmania, 39 Pillinger Drive, Fern Tree 7101. ❑

TRIGA COMMAND

ONLY $24·95

At last, the first joystick that puts the firing button where it should have been in the first place.

Now available from your Computer Dealer. This unique durable joystick is compatible with any Atari VCS, Atari or Commodore computer.

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High-Tech On Australia II — "bits of eight ... bits of eight"

As every true Australian sat glued to his or her TV through the America's Cup challenge, few would have realised that many of the sleek 12-metre boats carried a surprising array of computer hardware. Evan McHugh looked into how computers, some of them micros, helped Australia II to beat the Yanks.

EVERYBODY HAD them: all the 12 m yachts in Newport had an Ockam system, the British were fiddling around with an Apple, and the Americans were using an HP Exicomp.

Computers had been used successfully in the America's Cup as far back as 1974. Then, the American boat, Courageous, used a Data General system put together by Rich McCurdy to beat Southern Cross and a Hewlett Packard 9830A. Over the past ten or so years systems have become more refined and the range of applications a lot wider.

Throughout Australia II's challenge computers could be found: in design, performance analysis and while racing they took to the high seas and came up with a winner.

The Design Phase - A Chip In A Bottle

Designing a 12-metre boat that *will* win isn't easy. Models must be made of the various designs that are thought to have a chance, and a tank must be built in which to tow the model. The models are one-third scale, which makes them the size of many small yachts, so it isn't cheap either.

The Australian solution was to use a simulation program of the tank testing procedure. It ran on a Cyber 73, in Holland – a mainframe computer with the number-crunching ability required to test many different designs.

When the possible designs were narrowed down the normal tank testing procedure could then take over, but with most of the unacceptable designs already eliminated.

An added advantage of the simulation was that it provided data on the theoretical performance of Australia II in various sailing conditions. This was later compared to the actual performance to check that the boat was being sailed at its optimum level.

Performance Analysis

One of the important uses for computers on Australia II was in trying to get every last ounce of speed out of the design, the crew and the boat set-up. Many factors can influence the perfor-

mance of a boat and it is not always obvious when something is going wrong. With a computer you can tell if a boat is not performing as well as it could, given a specific set of conditions.

Performance analysis involved comparing one day's sailing with other sails in similar conditions. It could also be compared with the theoretical performance found during tank testing.

The Ockam system installed on Australia II was used to collect data for sail and boat performance. If a sail consistently did not perform as well as other sails, then it could be recut and tried again, or discarded as a poor design.

Attempts were made to determine which sails were best in which conditions; this was carried out with success in Melbourne. Performance curves were drawn up for a variety of sails, and this information showed crossover points of sails as the amount of wind changed. Thus it let the skipper know just when to change sails.

However, the wind in Newport is such a completely different barrel of monkeys that this approach had to abandoned. Whereas in Melbourne the wind speed remained constant from sea level to the top of the mast, Newport wind could vary by as much as eight knots. Not only that, but the wind could vary in direction over the same change in height by as much as 25 degrees. This meant that the top half of the mast could be tacking one way and the bottom half the other way. Sneaky American wind.

Under these conditions the rating of sails was given up, although the technique, under normal conditions, may still be useful in later challenges. It is hoped by Glenn Read, the Data General consultant involved in the Australia II challenge, that sail evaluation in real time will be possible in the near future. In this way it would be possible to test a whole range of sails very quickly and easily in conditions where the wind didn't alter very much over a short period of time. Glenn thinks it might also be possible to use such analysis in race conditions.

Checking Performance

Checking boat performance was a little different. Each night the data collected during the day was analysed. If the performance was not up to scratch they started looking for reasons why. They would talk to the crew, find out if they had been doing something different, and generally eliminate possibilities until they thought they knew what was going wrong.

This was the case with the use of trim tab on reaches. Trim tab on the keel is like flaps on a plane wing; it gives the boat extra lift. The crew had been using trim tab on reaches when they shouldn't have. When this was discovered they stopped and the instruments showed a dramatic improvement in performance.

In Newport the gear was still used to check performance, so that by the finals all performance analysis was complete. One interesting outcome of the final analysis was that the data obtained in race conditions was of much better quality than that gained during training, largely because a race is the real thing and the crew was trying just that much harder and concentrating for longer periods of time.

Going By Bus

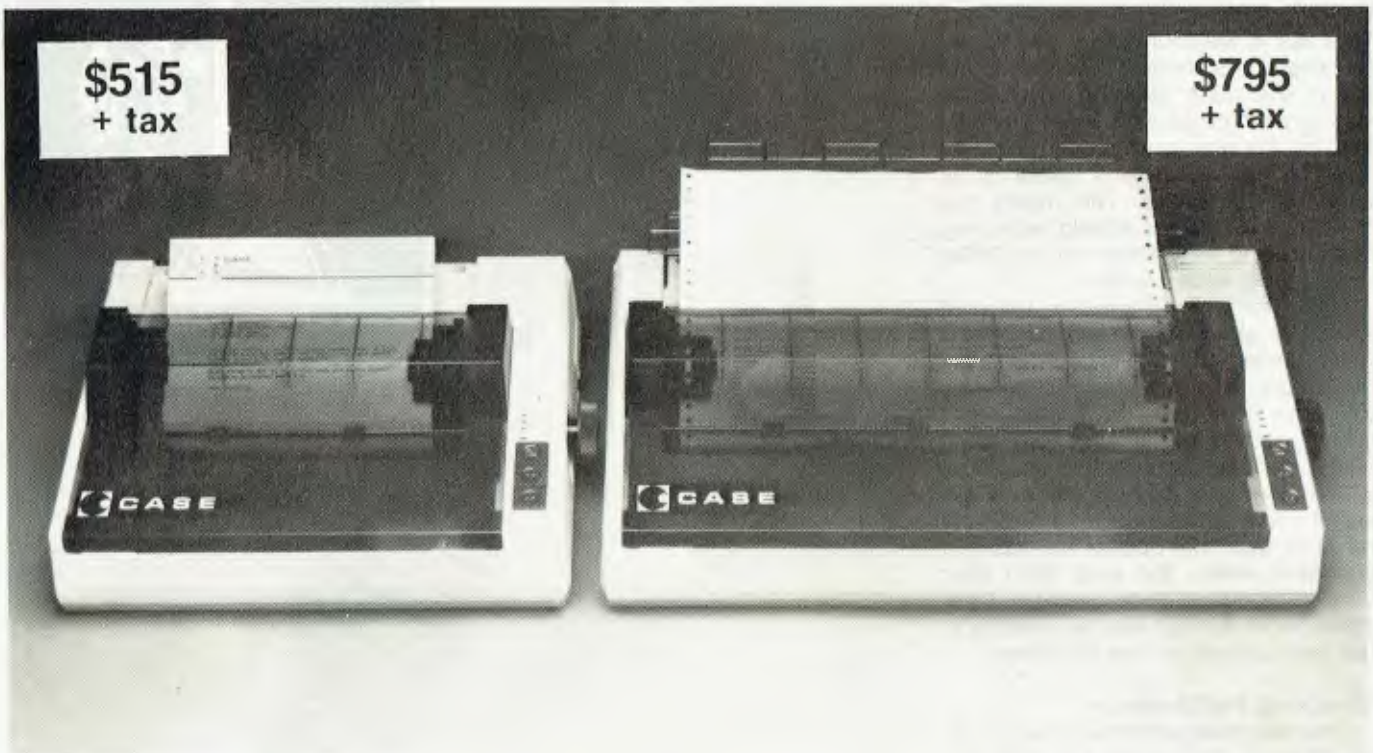
The technique of measuring performance was related to that of actually providing information during the race. The same equipment was used to collect the data, but the data itself was then sent via a telemetry link to a tender vessel where a Data General MP100 buffered it into 4K blocks and sent it to magnetic tape for later analysis. Up to 6 Megabytes of data was collected during a race. The telemetry link was necessary because too much power and space was needed by the magnetic tape drives to install them on Australia II.

The post-race analysis was done by a Data General Nova 4X located at the Australia II syndicate headquarters back on shore. No analysis was done in real time.

The racing system used, made by Ockam, was brand new. It was the second one ever made and had not been field tested when installed, but operated extremely well in spite of this. The navigational gear was located in the stern, where the navigator could get at it, and the CPU and interfaces were below decks near the mast. Instruments were all over the boat measuring various inputs. An Epson HX20 was also on board to carry out various user functions. ▶

Australia II — 16 computer displays on-board.

Write off 40%



CASE has released two new models in its DPX Series matrix printers.

If it weren't for their price, their capabilities alone would make them remarkable machines.

But at around 40% cheaper than their nearest competitor, they deserve your closest scrutiny.

The multi function capability of the DPX series enables use in a variety of applications. Alpha numeric or graphic printing, single sheet, roll or tractor feed paper.

They can even produce correspondence quality print and provide forms control plus vertical and horizontal tabulation.

The DPX 500 printers operate at 120 CPS, with 80 characters per line on model 510, and 136 characters per line on the wider carriage 515.

After you've compared these two machines to others on the market, you'll have to agree with us. It's an open and shut case. For CASE.

For complete details on CASE DPX 500 printers, contact your nearest CASE office.

CASE

CASE Communication Systems Ltd.

SYDNEY: 1-3 Rodborough Rd., Frenchs Forest, N.S.W. 2086. Ph. (02) 451 6655. MELBOURNE: Ph. (03) 529 7644. BRISBANE: Ph. (07) 221 1727.

The Ockam had an ASCII bus running at 4800 Baud which transmitted data in a continuous stream to the tender vessel. This was where the telemetry link came in. Using the link the team was able to transmit up to two and a half miles, although the tender vessel was rarely more than half a mile away.

While the instrument system was able to send, it was not able to receive. The rules state that no outside assistance may be given during a race, although a radio may be switched on to get weather information. In fact, in the last race Dennis Connor took a small 12 volt television on board so he could look at the race coverage and try to see wind shifts. Pretty clever thinking.

A parallel Ockam system was used to check the accuracy of the information on Australia II. The second system was on the tender, *Black Swan*, where, according to Glenn Read, the screens could display exactly what was on Australia II at the same time. "In fact, Bondy used to sit up on the deck at the top. We had a bank of about five displays there and he used to sit there and watch things like true wind direction, how far they were away from the lay lines and all that stuff."

Gentlemen, Start Your Inputs

There were six raw inputs to the system.

Boat speed was obtained using little paddle wheels on the hull connected to an analogue-to-digital interface. There were two such wheels; one on each side of the boat. One wheel was used at any one time using pendulum switching.

At the masthead the apparent wind angle and speed were obtained – 'apparent' because the boat is moving and so the wind will be different. It's like driving in a car with a 10 kph tail wind; if you were doing 20 kph you would think the wind was coming from head on at 10 kph. The same applies on the boat. Some readers might now be objecting that you can't go faster than the wind in a boat, and I could get into a long discussion about vectors and sailing, but this is an article about computers so we'll leave it for now. When the way the computer calculates true wind is discussed it might become a little clearer.

A compass heading was also taken. This used a normal magnetic compass attached to an optical binary-coded disk. A light sensor read the disk to determine the compass heading. This arrangement worked very well, although it did take a while to settle down if the boat engaged in some radical manoeuvres, for example in the pre-start jockeying, but during the race the compass could cope

quite easily. The compass was the lynchpin of the system in that many of the calculations made by the system depended on it.

There were potentiometers on the rudder and trimtab. The final input was a heel angle. A Loran navigation system was also carried on board, but was not interfaced to the computers.

System Calculations

The system calculated a dazzling range of functions. Some were, naturally, used more often than others, but all were valuable aids in sailing the course as well as possible. The most important ones were true wind speed, true wind angle and velocity made good (VMG).

True wind speed and angle were calculated using apparent wind speed and angle and boat speed. From there it was a simple matter of vectorising to get the desired result – see Figure 1.

The length of each line represents speed; for example, 1 cm = 1 kph. The angle DAC represents true wind angle. The length of the line AC is the true wind speed.

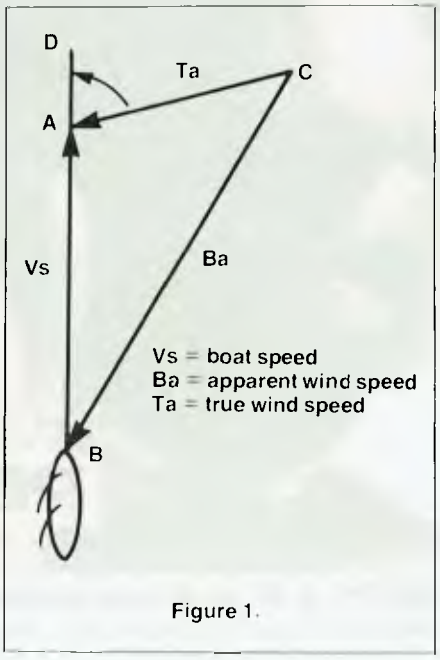


Figure 1.

The Velocity Made Good (VMG) is calculated in a similar way. VMG represents the speed from point A to point B. Given that a sailboat may not always be able to sail in the direction it wants (it can't sail directly into the wind), VMG is the result of vectorising the speed and direction it is travelling with its forward motion and sideways motion in respect of the direction it wants to go; see Figure 2.

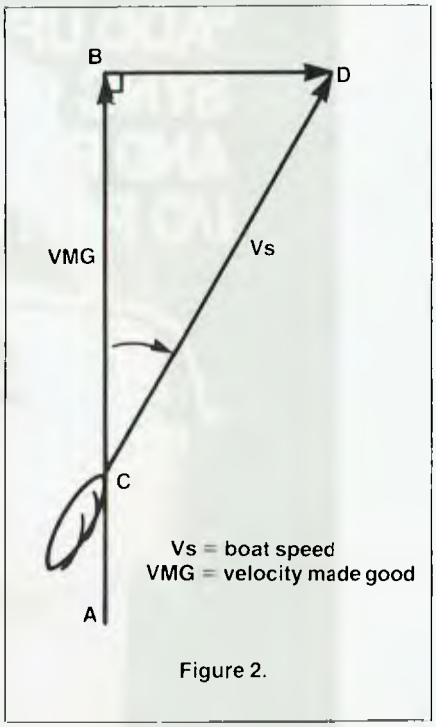


Figure 2.

VMG is the figure commonly used in representing gains or losses in performance. When the system calculates VMG it does so using the compass. It 'knows' the desired bearing and from the compass can find the boat's present bearing. It then calculates the difference between the two, finds out the boat speed, and *voila* ... VMG. VMG is also used in a number of other calculations, as will be seen.

The true wind bearing can be found using the compass and true wind angle – a simple matter.

It was possible to calculate the course on the opposite tack – a useful tactical tool – and the time to the lay line could also be found. The lay line is the point at which a change of tack will enable you to sail around the marker without tacking again. This was calculated from the boat's known tacking ability, based on wind conditions and previous observation. This line was constantly recalcu-▶

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Syndicate chairman Alan Bond with his yachting 'tactician' — a Data General microNova MP100 computer, on board the tender vessel, which cruised close to Australia II to collect statistical information.

Australia II's Computer Systems

Unit:	Nova 4X	MP100	HX20
Made by:	Data General	Data General	Epson
Processor:	Nova 4X	MP100	
RAM:	256K	64K	16K
ROM:			Microsoft BASIC
Languages:	FORTRAN 5	Assembler	BASIC
Display:	D200	D200	
Graphics:	G300		
Peripherals:	25M Winchester drive, mag tape 1600 bpi	Floppy disk, mag tape 1600 bpi	

lated as the wind shifted direction. The lay lines could also be changed to allow for race tactics. This was the case in the final race against Liberty, when Australia II sailed well past the lay line because of the need to cover Liberty all the way to the final mark.

Among other calculations was the leeway angle, which was based on the fact that yachts don't go in the direction they are facing; like a plane they slide along at an angle.

The distance lost in tacking was a calculation based on the VMG. When you tack you slow down, so this function calculated how much further ahead you would be if you hadn't tacked. It was particularly useful during performance rating and crew training to determine the best type of tack for certain conditions and to hone the crew's ability in tacking.

The function of 'apparent' speed and angle of the wind for the next leg was useful for determining the type of spinnaker to use. This is particularly useful when it is realised that the spinnaker has to be ready to go before the mark is rounded.

These were just a few of the calculations performed by the various systems. Some were worked out by the Ockam system and others were calculated by the Epson and displayed as user functions.

Real Time Computing – Race Day

When Australia II raced she had 16 computer displays located in a number of places. These displays were small liquid crystal Ockam displays, each of which could display any desired function simply by a machine-readable card for the desired display being slipped in. The displays were small so they would not get in the way – and in any case the crew had little time to look at a screenful of data. Each display carried a little microprocessor in it. The data was transmitted around the boat using a coax bus, so that only a simple T-junction in the cable was needed to plug in a display.

The navigator had five displays clustered at his station; he needed so many because most of his duties were based on calculations made by the computer.

There were two more displays at each of the two trimmers' stations, showing the boat speed and true wind angle. The trimmers also had charts to show if they were optimising the boat's performance, and they could make adjustments if necessary by calling out to the helmsman whether the speed was fast, good or slow. If they were going too fast it might mean the VMG was slower, perhaps because they were pointing too low in a tack; or sometimes during tactical manoeuvre they would trim for best performance from the sails and forget about the instruments.

The helmsman had two displays at each side of the boat – a 12-metre has two steering wheels. His display gave rudder and trimtab angles and true wind speed.

The last three screens were located near the central grinding pedestal, and displayed rudder and trim tab angles.

Quite often during races the information on performance had to be ignored. This was because outside variables or race tactics were of greater importance than straight-out boat performance. For example, it is a good race tactic to keep your boat between the mark and your opponent (this is true in match racing, though less so when there are a lot of boats). So, when he tacks, you tack, even though this may reduce your VMG.

It can be even more subtle than this. The navigator or tactician may make some subjective judgment about the race or the boat's performance quite separate from the system's analysis. For example, there might be more wind on the other side of the course, so they will steer a less efficient course to go over and take advantage of it.

It is interesting to note that while the compass was very important in many calculations, it was rarely displayed. It was more behind the scenes, the backbone of the system, although the navigator did have occasion to use it.

Underwater Computing

There haven't yet been many applications for computers involving ocean racing, so it wouldn't have been surprising to have encountered all sorts of bother taking a computer onto a pitching, rolling, salt-spray-covered racing yacht. In practice this was not the case; all the equipment performed very well.

The displays, for example, didn't stop working even when they were full of water. The crew used to complain that they couldn't read the displays due to condensation, and when Glenn Read opened the boxes to inspect the problem he found water sloshing around inside – but they were still working. He would rinse them off, dry them, spray them with Freon and away they went. Read thinks the fact that the displays used CMOS circuitry was a factor in their reliability. The problem, which was in the design of the box, was fixed before Australia II went to Newport.

Another problem was with the telemetry link. It was expected that the gear could transmit about three miles, but the range was initially found to be only half a mile. After much fiddling, the range was eventually increased to between two and two and a half miles.

The Rival Camp

The American system was a long way behind that used by the Australians. It was a Rochester system running on a Hewlett Packard Exicomp. This 1977 technology was so outdated that Hewlett Packard had to build a couple of machines out of spare parts because they were no longer manufacturing them. ▶

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Daisywheel	Triumph-Adler compatible ("Drop-in" system)	Dimensions	520 mm (W) × 454 mm (D) × 151 mm (H) 20.5" (W) × 17.9" (D) × 5.9" (H)
Number of printing characters	100 characters	Weight	14 Kgs. (31 lbs.)
Spacing	110 characters under 10 pitch. 132 characters under 12 pitch. 165 characters under 15 pitch. 82 to 220 characters under proportional spacing mode.	MTBF	2,500 hours at 25% duty
		MTTR	15 minutes
		Noise	Less than 62 db A (1 metre from the equipment)
Character spacing	1/120 inch min.	Buffer memory size	2 K bytes standard and expandable up to 8 K bytes (Option)
Line spacing	1/48 inch (1/96 inch possible by ESC sequence)	Option	Tractor (bi-directional, uni-directional), cut sheet feeder
Platen size	13 inches (printing line 11 inches)		
Ribbon	IBM82 compatible multistrike or single strike ribbon (Selectric II Ribbon)		

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The Yanks did have access to an Ockam system, but they did not use it to best advantage for two reasons. Firstly, they were more used to the numbers that came out of their older system and were apparently not prepared to learn the new system. Secondly, there were many updates to the Ockam system during the lead-up to the races. The Americans stuck with an early version and did not make use of later updates. "Why should we field test a product for a company" appears to have been the American attitude.

The Australians, on the other hand, always took the very latest version, with new enhancements, less bugs and greater reliability. The result, of course, is history.

High Tech In The Future

Glenn Read hedges a lot when it comes to discussing the future of computers in yachting. The possibilities have only just begun to be explored and besides, Data General will be involved in the next America's Cup, so he doesn't want to give too much away.

Some directions the future may take are very interesting, though. A system for finding wind shifts, or areas of stronger wind, perhaps exploiting some form of Doppler effect or lasers, may be used. This may sound far-fetched, but in the past so did the idea of computers making a difference to the outcome of the America's Cup.

A more realistic possibility is the use of computers like the Apple in future races. The software does not yet exist for them, but they offer distinct advantages in ease of use and ease of programming.

It should be noted, however, that the system used on Australia II was very advanced. It provided a lot of very sophisticated and useful information, so future development is likely to be enhancements rather than breakthroughs or spectacular advances.

The Men Behind The Machines

A considerable amount of technical skill is needed to put computers on a boat. In Australia II's case the skill was drawn from Australia and the United States and Holland.

Glenn Read, a field engineer with Data General, was the man most involved in the Australia II computer operation. He spent over a year working on the project. He was trained in the Air Force, where he spent four years working on the F1-11 Flight Simulator. He has also worked for Control Data, and has spent the last four years of his eight years at Data General in the Technical Support Group.

Glenn's sailing experience is nothing to be sneezed at. A competition sailor for 20 years, he was World Soling Champion in 1982. He was also back-up navigator for Australia II.

Glenn started the Australia II project in April 1982. He visited the US, where he purchased the Ockam system, and the first computer hit the deck of Australia II in July of 1982. From then it was a case of ironing out the bugs and enhancing it to give the information required.

The Ockam system itself was designed by computer whiz Rich McCurdy, whose company specialises in designing computerised instrument systems for boats. His Ockam system for Australia II cost $80,000, although ocean racing systems only cost about $6000.

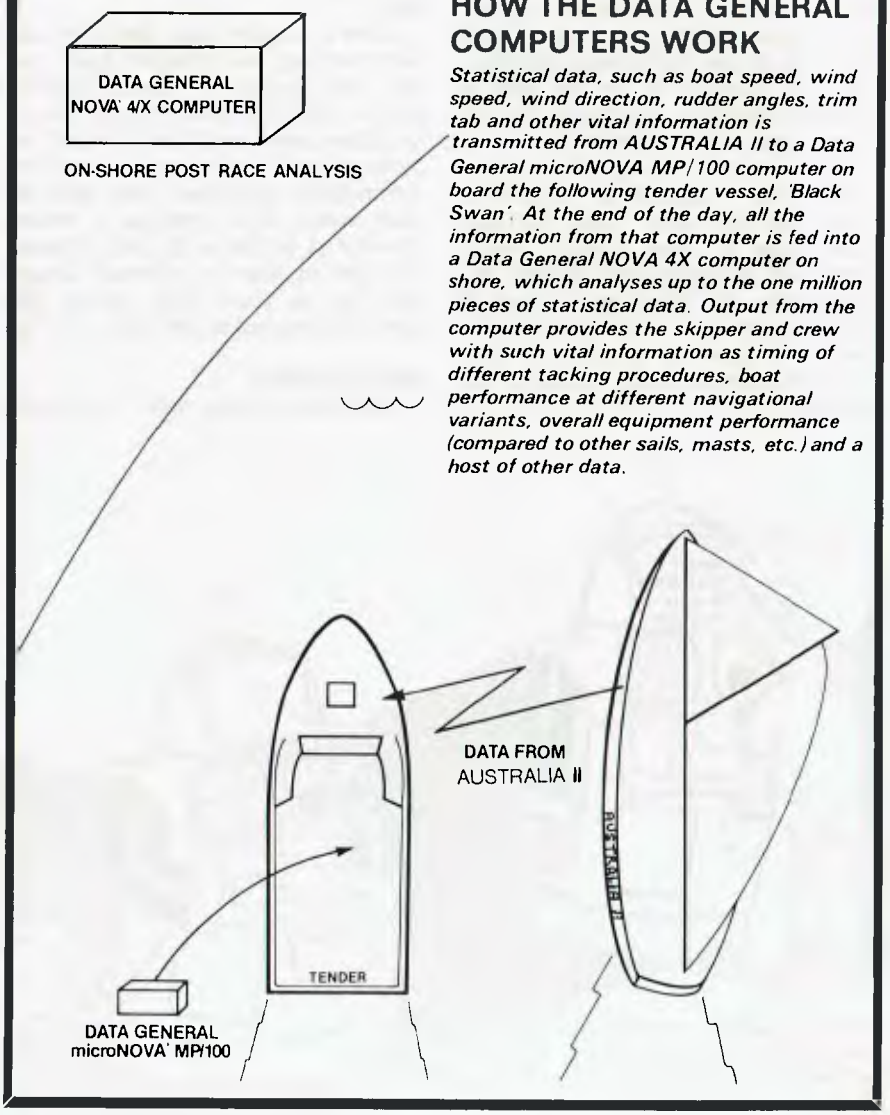
McCurdy has been involved with America's Cups since he tried to put a system on American Eagle in 1964 and again in 1970 on Intrepid. As mentioned before, he successfully ran a Data General system on the American defender, Courageous, in 1974.

McCurdy designs software and hardware. He programs happily in almost any language – BASIC, Assembler and, God forbid, machine language. He also leaps tall buildings at a single bound ...

Peter van Oossanen of the Netherlands Ship Model Basin was responsible for writing all the performance analysis software run on the Nova 4X. ❑

HOW THE DATA GENERAL COMPUTERS WORK

Statistical data, such as boat speed, wind speed, wind direction, rudder angles, trim tab and other vital information is transmitted from AUSTRALIA II to a Data General microNOVA MP/100 computer on board the following tender vessel, 'Black Swan'. At the end of the day, all the information from that computer is fed into a Data General NOVA 4X computer on shore, which analyses up to the one million pieces of statistical data. Output from the computer provides the skipper and crew with such vital information as timing of different tacking procedures, boat performance at different navigational variants, overall equipment performance (compared to other sails, masts, etc.) and a host of other data.



ELAMI©
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By Tom Moffat,
39 Pillinger Drive,
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He walks! He talks! He shakes your hand! He entertains you when you're happy, consoles you when you're sad! He listens to your troubles and offers free advice!

WELL, ALMOST. Elami is one of the first of a crop of personal robots that may some day be our constant companions. The question is, do we want a companion like that, standing in for the human quality called friendship?

Elami, in fact, is being billed as the world's first educational electronic friend, and he'll soon show humans what it's like to know a robot. Everywhere he's appeared he's brought the house down, but when he's looked at ten years from now, he'll most likely be seen as a primitive creature indeed. That's how fast things are moving in this business.

Lonely Prototype

At the moment there's only one Elami, presiding over an electronics lab at Flexible Systems in Hobart. He's what's known in the business as a 'working prototype'... on the outside, a sleek red and white body looking as much as possible like his production model clones (except for the sticky-tape holding his hands together). Inside, he's a mess – bits of wire, circuit boards, a highly modified VIC-20 computer, and more sticky tape.

Elami's circuitry has been chopped and changed, and changed again, over and over, mostly by Flexible Systems' former R&D man Allan Branch. His development work on Elami's innards was 'noticed' by one of the heavies from Commodore Computers, and Allan was soon swept off to America to become Director of Robotics for that company. The job of Elami's personal surgeon then fell to yours truly, shortly after Elami had starred at the Tokyo Toy Fair.

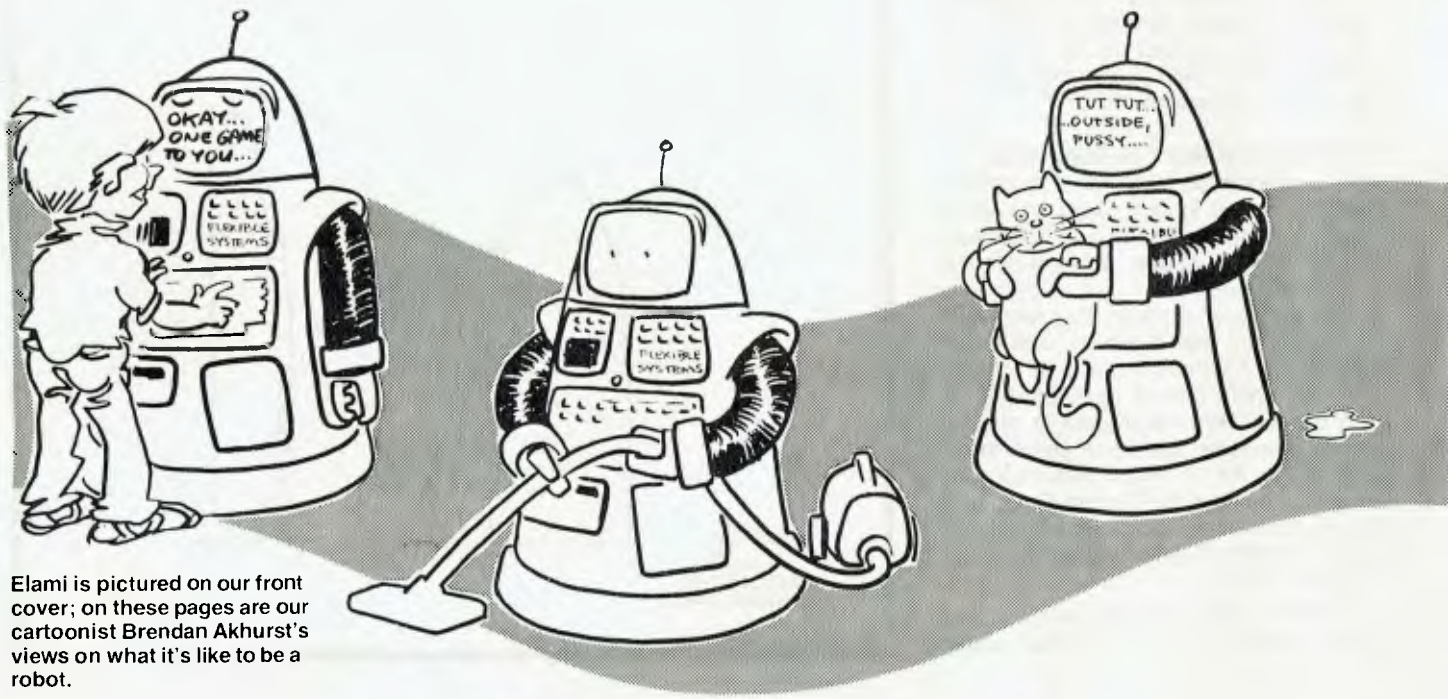
Bad Traveller

Elami didn't travel well. The journey from Tokyo to Hobart, bouncing around from airport to airport, left him with a bad case of prolapsed guts. All the circuitry was lying on the floor of his abdominal cavity; most of the interconnecting wires were broken, and nobody had a clue how it all went back together. And to top it all off, Elami was booked for television appearances, shopping centre sessions, and the Hobart opening of Information Technology Week. PANIC!

To make a long story short, we got him going in time, complete with a VIC-20 BASIC program to make him do his tricks.

When the program first runs, Elami moves forward, bellowing out his name through his inbuilt speech synthesiser: *Elami! Elami! Elami!*

He's constantly reading his sensor band (the red ring around the bottom), and when he collides with something, he says "Oh" and backs away. If he feels something slightly off-centre he says "Left" or "Right" and turns away. If Elami doesn't feel anything after a few seconds he stops moving and begins a



Elami is pictured on our front cover; on these pages are our cartoonist Brendan Akhurst's views on what it's like to be a robot.

More Robots!

Meet Topo – he's the little feller on the right making himself useful serving fruit and wine from his 'Androwagon'. Topo is one of three 'Androbots' being marketed in Australia by Futuretronics; his brothers are 'Fred' (little brother) and 'Bob' (big brother – well, it is almost 1984).

Once you've acquainted Topo with your home, a simple computer command or joystick movement will start him running. For example, while you're in the kitchen the keyboard command 'Topo to patio' will send him scurrying over a previously memorised route to serve drinks to guests.

Topo can be taught to talk and sing in many languages with his optional programmable voice, and you can write programs to direct him or buy software packages for him. So when you've run out of new peripherals for your computer, maybe the next answer is – a robot! ❑

spinning display of a LED (light-emitting diode) array on top of his head. After a few seconds this stops and Elami says: "(Beep) The time is...." and rattles off the time, courtesy of the VIC-20's real-time clock. The procedure then repeats continuously.

The TV monitor for the VIC-20 is mounted where Elami's face should be, and the keyboard is in his belly, just right for a child to walk up to him, type, and see the screen at his/her own level. When Elami's programs are running, the screen becomes a face, with eyes, nose, and mouth. The lips move in 'lip-sync' as Elami speaks, and the whole effect is rather startling.

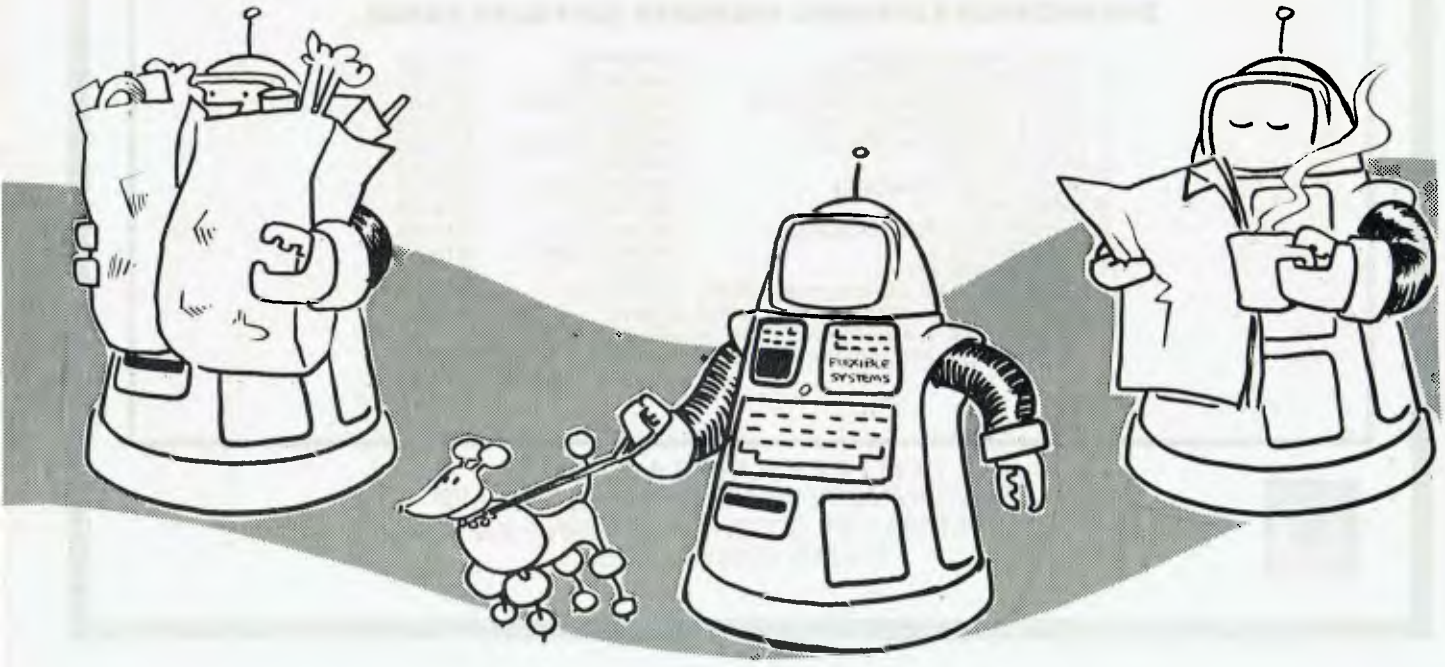
The program described above was thrown together in a morning to make Elami show off some of his talent for Information Technology Week. It's the only thing the public has seen Elami do, but obviously there's been a lot of work done since. We won't detail it here or that robot-maker 'down the road' might get a few ideas – and we wouldn't want that, would we?

Production models will look the same, but will be much, much more sophisticated in capabilities. Hint: speech recognition – we're working on it. Built-in video games; disk drives; a printer; precision robot arm. And ... still to come ... artificial intelligence.

Son of Elami

Big Elami stands about a metre high. There's a 'son of Elami' in the works, about half a metre tall, and a 'Baby Elami' a quarter metre high (notice how they all relate to the powers of two?). It had been hoped to have them on the market for Christmas, but they obviously won't make it; the project is just too big.

When production starts it will take place in Hong Kong, under the auspices of the Re Foundation that suggested the idea in the first place. It would be lovely to manufacture Elami in Australia, but it's the same old story ... prices, wages, lack of venture capital. Maybe someday ... ❑



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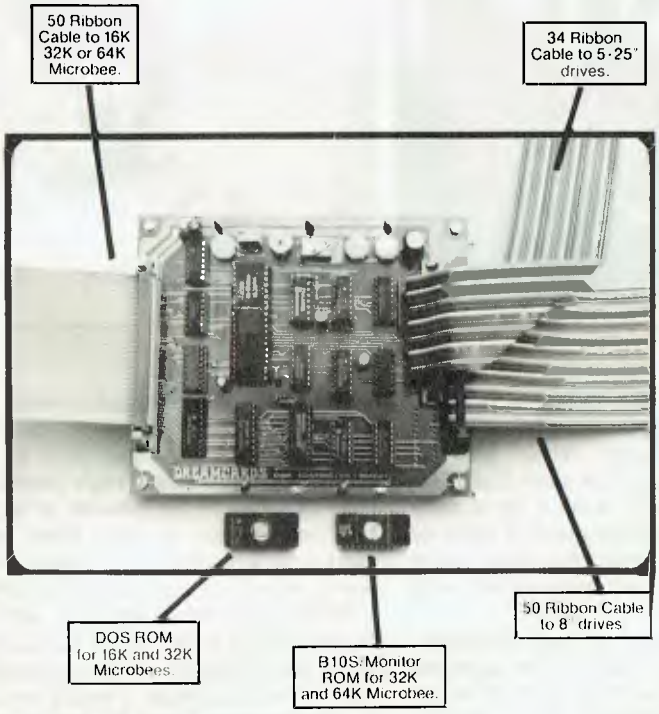

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Publishing Your Software

We've recently had a few enquiries from readers asking us how to go about getting their software published, so Natalie Filatoff went out and found out all about it.

SELLING COMPUTER software, we've been told, is rather like selling books, records or chocolate bars. Home programmers can get their potential Cherry Ripes into the marketplace in one of two ways: by organising the manufacturing, packaging, promotion and distribution themselves, or by approaching a software marketing firm to do it for them. Both methods have advantages and disadvantages.

The most obvious advantage of handing your goodies over to a marketing company is that you shouldn't have to worry about them any more. We say 'shouldn't' rather than 'won't' because there are some unscrupulous people around and it's largely up to you, the programmer, to identify them and avoid them. It's matter of not *giving* your lollies to strange men (or women).

On the side of doing it yourself is the fact that you can make more money – provided everything runs smoothly and you have a considerable amount of time and money to devote to achieving that goal.

Reputable marketing companies can save you an enormous amount of running around, and the possibility of making costly mistakes. They take the risk, and you know what sort of return you will get from each sale.

Criteria For Selection

Most software marketing firms process submitted programs in a similar manner. Imagineering, a Sydney-based company, which distributes for 53 American computer firms and also handles some Australian products, has definite criteria on which new programs are evaluated.

Says Phil Woolly, Imagineering's marketing manager, "We accept all kinds of products – educational products, business products, entertainment products and so on. The criteria for each are slightly different. Entertainment products are assessed on speed of loading, ease of use, graphics, playability, documentation, potential for sequels and colour. With business products, good documentation is of prime consideration."

Doug Ruttan of Sourceware – a distributor of software for the IBM Personal Computer hoping to start publishing Australian-written programs next year – says, "We'll be looking at all kinds of programs for the IBM-PC, and those running under PC-DOS. We'll be saying to Australian software writers, 'Hey, we've got a distribution channel, where are your chocolate bars?'

"Then, when someone comes in with a program, if it's well structured, it looks like it won't cause a support nightmare, it runs efficiently on the computer, it's user friendly and it doesn't require any oddball-type hardware or software add-ons to run – in other words, if it's pretty plain vanilla, we'll negotiate for publishing rights."

Another company, Ozi Soft, distributes software for the Atari, Commodore 64, VIC-20 and IBM-PC, and receives a high percentage of games software for publishing. Manager Kevin Bermeister says, "The concept behind a program is extremely important. Games also have to be well programmed in machine code, they must have high resolution, fast-moving graphics, a lot of colour and exciting sounds.

"If a customer is standing in front of a computer in a store, looking at a program, and he's dazzled by this thing flashing across the screen, to the ac- ▶

companiment of some amazing sound, your sale's made. Of course, if he plays it for half an hour and there is only a flashing image and magnificent sound, that doesn't make a game in itself.

"So, another thing that makes a good game is how long you can keep a person playing it without getting bored. Many of the most popular games these days have several levels. Eventually, of course, you get bored with all games. They're disposable."

Nobody Laughs At You

If your program doesn't quite come up to standard, marketing firms won't laugh uproariously or turn away in disgust. The three companies we spoke to were all committed to fostering good concepts.

Says Bermeister, "If you've got a concept and you can put it down on paper, you can build a program around it. Sometimes we get programs that aren't quite right, but you can recognise a good concept. We'll then encourage the programmer to rewrite the program, or make additions to it. If it's still no good and we like the concept, we may buy the right to develop it ourselves."

Doug Ruttan, of Sourceware, goes still further, saying, "We will be receptive to anything. We're even prepared, if someone's got a good idea and wants to write a program, to advance them some funds. If they need an IBM-PC to write on, they can come and see us. If they want advice, they can come and see us."

Funds are, naturally, any programmer's main objective in selling software. Few companies are prepared to pay in advance, and most have a sliding scale of paying arrangements, which changes depending on how good your product is.

Ozi Soft has basically three levels of payment. To an excellent programmer, like Mike Davis, the writer of the company's 'Mosquitoes' and 'Cops and Robbers' games, the company will offer an exclusive contract.

Says Kevin Bermeister, "With an exclusive contract, we'll guarantee the person's royalties every month. Even if the program doesn't sell as much as we anticipated in a month, we still pay him the money. In return, we also get first rights on every program he makes. If we don't like it, he can take it to anyone else. It certainly wouldn't pay us to do that for everybody."

Most people who publish with Ozi Soft sign a standard contract or a variation of it which suits them. "The standard contract," says Bermeister, "specifies the name of the program, it specifies that the copyright is always held by the owner of the program, and that we own the license to manufacture and distribute the program in the 'territories' for a certain period of time, whether it be 12 months, 18 months, or more. In our case the territories are New Zealand, the United States, Australia and the United Kingdom.

"After that period of time," he adds, "if we terminate the contract, the program has to be returned to the owner in its original master form and all distribution will stop from then on."

Ozi Soft will also occasionally purchase a program outright. Says Bermeister, "Sometimes a person will come in with a program, say he thinks it's worth a thousand dollars and ask us if we want it. Of course, if we think it's worth it, we'll pay. Then we become the owners of the program, to do whatever we want with it."

As Phil Woolly of Imagineering points out, this can be a foolish agreement to make. "It's unfair to both parties to buy outright," he says. "If it sells fantastically well, the programmer loses out, and if it's a dud, we lose out. We pay unit for unit. Once we produce and manufacture the product, the writer gets the full value and so do we. Normally, a programmer is looking at a return of about 10 per cent of the product's retail price – that's with him providing the master, and us providing the rest."

Doing It Yourself

Imagineering, and most other companies, will take on the distribution of a product only. That means the programmer handles the manufacture, documentation and packaging himself and gets a far larger share of the profits. It also affords him the benefit of an established and proven dealer network, which pays according to a predetermined plan.

Organising the whole process yourself can bring the greatest return, but most people who have done it or considered it say it's virtually a full-time job.

John Skaller of Cybernetics Research marketed two programs for the Apple computer about 18 months ago. 'Grafpak' and 'Phil's Cheap Editor' sold 700 and 200 copies respectively. Grafpak was sold to dealers for between $50 and $65 – depending on how many they bought – and Phil's Cheap Editor for about $40.

Skaller finds it difficult to estimate how much it cost to produce and promote each unit, and therefore to calculate exactly how much he made, but he says he managed to live off the return for about six months.

He describes the process as follows: "We copied the disks ourselves and used labels printed on our printer. The manuals were printed by an offset printer. To sell the programs, we rang up dealers and asked them to take copies, and retailed some ourselves. It was quite simple."

He recalls the venture as an "expensive exercise" and says as many of the production components as possible were purchased on credit – such as the printing and the disks. Advertising represented the greatest expenditure, costing as much as $10,000 for numerous full-page, full-colour magazine ads.

While Skaller still maintains that "the biggest problem in getting someone else to do it for you is that they take so much of the money," he also says, "If you're a home software writer, it's probably not worth doing it, because it would be very hard if you didn't have a lot of time and money. It was always our intention to become a professional software company, so we were able to put a lot of effort into selling those programs."

Ozi Soft's Kevin Bermeister agrees: "If you're going to do it half-heartedly, you're not going to succeed." Stating the case for publishing with a firm like his, he says, "A program on tape would normally cost six or seven dollars to produce and market. If you put that out and you sell it at eleven dollars to the dealers, you'll make about four dollars a unit. Now, we say, we can manufacture that program cheaper because we're manufacturing in bulk. We pay you three dollars, you're making a dollar less per program and you've got no hassles."

Bermeister believes that one of the biggest problems of producing programs on a relatively small scale in Australia is the cost of packaging. At the moment Ozi Soft markets all programs in a standard box and changes the tape label to suit. Says Bermeister, "To put a box like that together, with the full graphic image, can cost you in excess of $3000. You can't recover the cost of that packaging on one program in this country."

Hence, Ozi Soft will soon be distributing the best of its programs in the United States and the United Kingdom. "The royalties will be less," says Bermeister, "because there are a lot more expenses involved and sometimes we have to go through a third-party distributor, but the quantities you sell are going to be so much more. Here, our top-selling programs might sell about 350 copies a month. There, provided the program is high-quality, you can think in terms of thousands."

Imagineering already distributes some Australian programs in the United States, but Phil Woolly stresses that they have to be exceptional to succeed. "Distributors over there," he says, "get something like 4000 to 5000 new products a month. A product has to sell about five or six thousand titles before

it breaks even, and a really successful title will sell around 50,000 copies."

The potential market may be enormous, but John Skaller will testify to the difficulty of breaking into it if you don't have "money and connections".

Advertising Yourself

Another aspect of marketing which professional companies are better equipped to handle than less experienced individuals is advertising. Most firms allocate large advertising budgets and also distribute catalogues of all their titles to dealers.

"The catalogues," says Kevin Bermeister, "are probably one of the best ways for us to promote the programs. They describe the programs, what they're for, if they need extra memory and so on. The dealers hand them out to customers, who take them home and look through to find all the things they need, might need, or would like to have."

What virtually no one can protect you from, when publishing software, is the possibility (some say likelihood) that your program will be pirated. Everyone involved in the industry agrees, as Phil Woolly put it, "pirating is horrific".

"It's illegal to copy software," he continues, "but one of the major reasons for pirating is that you can't get access to some software. Stores often don't carry a comprehensive range of products. The education market is the worst, because the dealers don't carry education software, so the schools can't get it. If they can get one copy, it then gets handed around the school. We address the problem by continually making sure all updates of products are available freely to the stores."

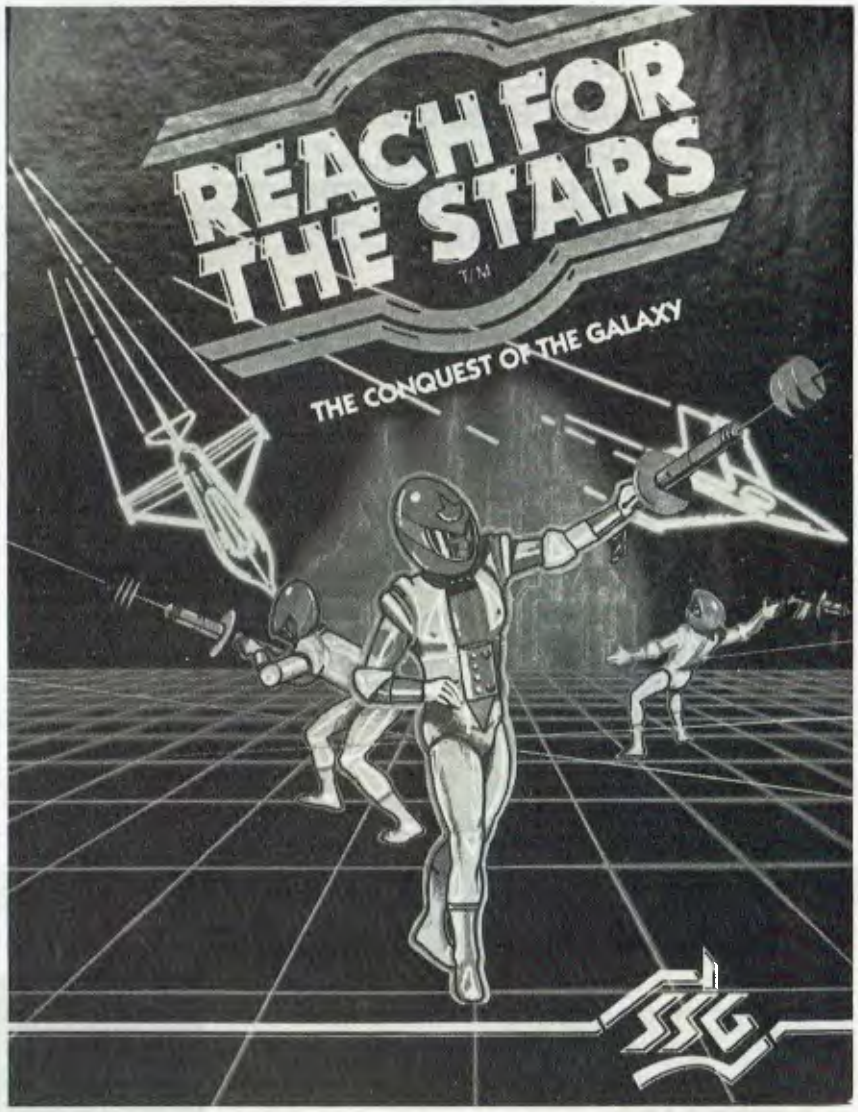
Kevin Bermeister sees the problem also in terms of "a few shady characters around in the industry, who have no regard for copyright and simply take a program, copy it and sell it." He adds, however, that legal precedents have just been set in America which give the programmer greater protection and that these should soon follow in Australia.

At the moment, says John Skaller, "You just stick (C) Copyright on your program and hope for the best."

With reference to dishonest distributors, Doug Ruttan of Sourceware says, "You will be ripped off if you let yourself be ripped off. You have to look at a guy's track record and check him out. Try and establish a worth for your package and then talk to the marketing people and interview *them*."

Evaluating Your Product

Evaluating your own product can be quite difficult if you have little experience in the field. Basically, it's a matter of comparing it with similar programs already on the market – hopefully you won't find too many for the computer you're supplying.



The complex and fascinating 'Reach for the Stars' was written by Roger Keating, a highly successful Australian games programmer, and is manufactured and distributed by SSG, an Australian software publishing company.

Some products the marketing companies won't accept for publishing and distribution. Highly specialised programs fall into this category. Says Phil Woolly, "There's no point in our getting involved in a product that's only going to sell five units a month. The costs of producing and marketing don't warrant it. The programmer is then better off going out and selling to a few dealers," or, says Doug Ruttan, "to the end user himself."

Another point to consider, when deciding whether to publish yourself or offer the rights to a company, is whether you can gauge the market for your product adequately. Andrew Farrell, a 17-year-old programmer for Ozi Soft, says, "I looked into selling my programs myself and decided it was pretty well pointless. It's a lot of work, and if it really takes off, then you're just in no position to keep up the pace."

Says Doug Ruttan, "A person may be very good at putting programs together technically, but if they can't effectively ... well, you know ... it's like selling chocolate bars. You and I could cook up in our little kitchen the greatest chocolate bar. It could be the most wholesome, the most flavourful ... whatever we want, right? But unless we can get the chocolate bar to those fifty thousand milkbars out there, nobody's going to make any money." ❑

Addresses Of Publishers

Imagineering: 3/579 Harris St, Ultimo 2007. (02) 212-1411.

Ozi Soft: 7th Floor, 50 Clarence St, Sydney 2000. (02) 29-6330.

Sourceware: 4/73 Albert Ave, Chatswood 2067. (02) 411-5711. ❑

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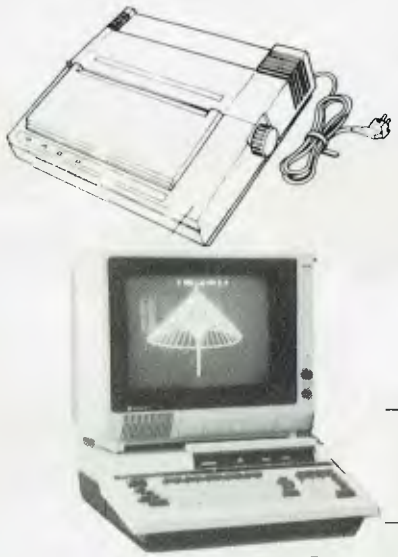

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Should You Buy An 'Orphan' Computer?

An 'orphan' computer is one that, for some reason, has been abandoned by its manufacturer or distributor. Is there ever a good reason for buying one? Eric Lindsay discusses the question.

A COMPUTER may be abandoned for a variety of reasons. A new model with similar capabilities may have superseded the older version; a good example of this is Tandy's TRS-80 Model 1, now replaced by the similar, but more advanced, Model 3. The distributor may have changed its target market, and sells less costly equipment; Dick Smith stores now sell the VZ200 and the Wizzard, but no longer sell the System 80 or the Exidy Sorcerer, having sold their remaining stocks at considerable discounts.

A company may leave the personal computing field through takeovers or business setbacks. For example, Ohio Scientific Instruments has been bought, and sold, several times since 1981, and its Challenger SII line of personal computers was sold off at prices as low as $100.

A company may continue to develop cheaper models, thus driving down the price of older versions. As an example of this, the Commodore PET line can often be obtained at discounts from dealers who have demonstrator systems in their shop.

Orphan computers are not for everyone. No business should consider buying one; businesses need continuing support for their equipment, and a large range of programs available. There are about five general groups of microcomputers that are suitable for business. In decreasing order of attractiveness, these are the IBM-PC or IBM 'workalikes'; Z80-based systems with CP/M; Apple or Apple 'workalikes'; TRS-80; and Commodore CBM. Before all the dealers take up their pens (or word processors) to explain why I am wrong, I will add that this order is not my view of which system is 'best', but it is pretty much the order in which business programs are available.

There are, or will soon be, more programs for IBM-PCs or IBM 'workalikes' than for any other system. Many of these programs will be lightly modified 8080 code, originally written for CP/M systems, and will thus run slower on the IBM-PC than on their original systems. This is unimportant. The point is, there will be more business programs available for the IBM-PC than for any other system on the market. The first choice for a business will therefore be an IBM-PC, or one of the often nicer IBM-compatible systems now available. ▶

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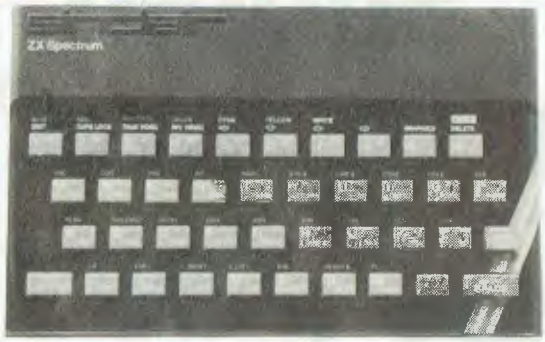

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The second choice for a business is any system that runs CP/M. I believe the best choice here is an S100 bus system, since it can be easily upgraded. However, it will be more expensive than a single-board computer, and you must find a knowledgeable and helpful dealer to put the system together and maintain it for you. This can be more than a little difficult, as some dealers are much better at selling systems than they are at maintaining them.

For the smaller business, it is well worth considering some package system with everything included, since these are usually cheaper than an S100 system. You could consider the Kaypro or one of the new breed of portable computers (see *Your Computer* September and October 1983), or the Cromemco C10 or Morrow Micro Decision. All these are available for less than $3000 including disk drives and some business programs. A printer will cost you extra.

A few comments about CP/M are relevant. I personally think CP/M is a disaster, to which only experienced programmers should be exposed. The manuals are a mess, and anyone who has to master it will almost certainly end up buying one or more of the many 'understanding CP/M' books that appear in computer stores. However, CP/M does provide compatible programs, and thus allows you to take programs written for other CP/M-equipped systems and convert them for use on your system. This one advantage outweighs all the disadvantages, at least for business users.

There is an enormous number of programs available for the Apple II computer, and these may well include precisely the ones your business needs. Unfortunately, the Apple is very expensive in terms of buying the hardware. After buying the Apple itself, you then have to buy separate disk controllers and disk drives, and you cannot use standard components, only ones that are Apple-compatible. You also have to buy special cards to run printers and other equipment, while these are often standard on other computers. If you find the right programs for your business needs, however, the Apple can be a good choice, as there are numerous dealers and a well-established repair service backing them.

The various TRS-80 systems sold by Tandy may be worth considering. There are not as many programs available, but servicing facilities are excellent, and many dealers will send computers away for repairs.

Commodore also has a number of business programs available, and if you can find suitable programs, a Commodore 64 or larger machine could be a good choice. For example, there is an excellent set of business programs for the Commodore 8096 called 'Silicon Office' that will cover most of the needs of many small businesses.

Not For The Children

There is another category of buyers who would be best not to consider the orphan computer. If you are buying a computer for your children, you probably should think in terms of a low-cost games-oriented system – something under the $300 range such as the Sinclair, the VIC-20, the VZ200 or similar. These will do an excellent job of entertaining children (or adults), and are almost as good for learning the elements of computer programming as are larger, more elaborate systems.

Who is left to buy an orphan system? The answer is hobbyists, or those who need a powerful computer but can't afford to pay the usual price for a business system.

The advantage of the orphan system is mainly the excellent price. The big disadvantage is the lack of dealer support; there will be no 'hotline' to telephone for answers to problems. There may also not be a warranty when you buy, and very few programs will be advertised in the computer magazines, nor will the magazines publish many programs for your particular system. Your friends with better-known computer systems will tend to find you just a little peculiar.

Luckily, most of the disadvantages are more apparent than real. My past experience with dealers has not been all that good, and I therefore tend not to be particularly worried about dealer support. There is now a number of independent repair services which will repair any brand of microcomputer at fixed prices. Look in the classified advertisements in the local electronics and computer magazines for details. Also, once a computer has been working for a while, it tends not to need many repairs.

Hunting For Programs

Finding programs is more of a problem. You need to consult specialised magazines for your particular computer. These are usually published by a user group or sometimes by a dealer, are rarely as attractive as *Your Computer*, and are often poorly written and difficult to follow. However, they do contain hard information and tips that would otherwise take years of experience to find. The club news column in computer magazines is a good way to contact them.

You will probably not be able to find a suitable club nearby, and may even have to join a club located in another country. Provided you can find one that has a newsletter, this will provide you with plenty of programs.

You will also find that programs are often cheaper for orphan computers. I realise there are supposed to be economies of scale when producing programs, but large advertisements and fancy packages cost money. Games that cost Apple owners $39.95 are often available for orphan computers for $10.

I recently sent off to the USA for a game costing $11.40 including postage, and instead received a disk with all the games that company produced for my system, because they were no longer advertising or stocking games for it. Today I sent off $22 for a set of 36 programs, a special deal from a software company for members of a user group. Also, many user groups for orphan computers co-operate in producing their own versions of popular programs, and make them available to members without charge.

Particularly good choices in orphan computers are ones that run programs intended for other more popular computers. Obsolete CP/M systems, or those that imitate the Tandy TRS-80 or the Apple II, ensure that you can always find programs.

One computer that is especially worth considering is the Exidy Sorcerer. This was discounted to under $500 recently, and there are user groups in Australia. You could produce a system with disk drives running CP/M for less than $1500, and take advantage of all the CP/M programs available.

Another good possibility is the System 80. A system with disk drive could be assembled for about $1500, and this would use the majority of programs made for the TRS-80 Model 1.

My own choice of orphan is the Ohio Scientific, which has a 200-300 member user group in Victoria, with many members producing their own versions of parts of the computer for commercial sale. I bought my second OSI Superboard for $100, added memory expansion for $17 (plus the memory chips), and a disk controller for less than $35. An Australian-designed version of this computer has just been released at far less than the normal price for an equivalent system, so it is possible to buy brand new orphan computers. However, the older a computer is, the less it is likely to cost you.

Now I really must stop, because I have a minicomputer with four 20 cm disk drives here, and I want to see if I can connect them to my system. After all, I wouldn't want to waste the $14 it cost me for the petrol to collect it. ❑

The Christmas Nightmare - Buying Your Child A Computer

By Helen Burnett

Word Processing Centre, Canberra

SCENE: Christmas in a large department store. A long line of kids and wilting parents waiting their turn to see Santa. Santa sits with a child standing beside him.
SANTA CLAUS: "Well now, and what is your name?"
JOHNNY: "Johnny Smith ... do you really like Coke?"
SANTA: Taken aback, "But of course, don't you?"
JOHNNY: "Yes, but I don't drink as much as you."
SANTA: "Why do you say that? How do you know how much I drink?"
JOHNNY: "I don't know exactly, but the Coke is always gone on Christmas morning."
SANTA: "Ah! So? I enjoy a Coke after all the travelling I do."
JOHNNY: "Yes, but if everyone leaves you Coke and you drink all of it, well, that's a lot of Coke. I mean, if there are 40 houses in my street and they all leave Coke for you, and there are 80 streets in my suburb, well, that's ... that's ... well, it's an awful lot of Coke! And anyway, what about the next suburb and the next?"
SANTA: Hesitatingly ... "Yes..."
JOHNNY: "Anyhow, aren't you going to ask what I want for Christmas?"
SANTA: "What do you want for Christmas?"
JOHNNY: " I want a computer. I could play Space Invader games ... rat-a-tat ... g-r-r-r ... pow! And I could do other things too."
SANTA: A bit stunned ... "Oh! What?"
JOHNNY: "I could work out how many Cokes you drink."

WHAT A CHANGE from 20 years ago ... and dolls and toy trucks and youthful innocence! We have entered the world of technology and sophistication; we have come of age!

Or have we? Have we entered an age of change whose pace is in many ways too fast? Are we skipping basics? Are we moving too quickly for our children, robbing them of childhood and projecting them too quickly into our sophisticated technological age?

If we think it can only be advantageous and valuable for our children to have early contact with computers in this increasingly computer-literate society, at what age has a child mastered sufficient basics but not reached rigidity of thought, so that the acceptance, learning and mastering of machines doesn't become a slightly scary or wary adventure?

At what age do machines aid at an educative level, rather than just give pleasure at a social (or anti-social) level?

The answers are there – from leading international computer-operating educationalists – and they have some good points, both for and against, none of which I intend to go into here and now. Let us assume, for the purpose of this exercise that we, as parents, have made that momentous decision to provide our children with a computer for Christmas. Where do we start?

Avoid The Mystique

Computers really lose their mystique when you realise that, definitively, any form of machine which works on a logical pattern, such as a calculator, is basi-

cally what the outmoded dictionary definition of the word calls a 'computer'.

In surveying the range of home computers now available on the local market - not to mention the international market, nor what the future may bring – it is a wonder to me how any choice is made! Even basing a selection on cost alone is a daunting exercise and I make no attempt here to compare products. I doubt in fact that any single person, unless fully employed in an R&D capacity, would be able to assess independently the enormous range we, the consumer - and in many cases the 'ignorant' consumer – are faced with.

'Word of mouth' remains the age-old criterion by which the majority of us lead our lives. Once a brand has been purchased and used, it is psychologically determined that the operator is 'sold', and as all human beings are resistant to dramatic change, we will in all probability move forward within the brand framework to which we were first introduced. In the absence of more objective criteria, there may well be worse ways to choose.

We are faced with machines ranging from glorified calculators to full-blown and expensive computers. We are confronted with a range of software that is mind-boggling ... and with a terminology which appears in no dictionary. We feel foolish when confronted with the slick salesman, thinking perhaps we ought to know what he is talking about – and don't – when we latch onto words which are familiar, but suddenly realise mean something completely different. In fact we very often leave the shop more confused than when we entered it!

Take a word of advice – do not let yourself be snowed! If you don't know the words, then ask the salesman what he means – make him slow down. Do not fork out your money for something when you don't know what it is! If you think you've entered an alien world, don't take that world home with you. You could find yourself buying the wrong things at the wrong time – a bit like buying a freezer when you went in to buy a refrigerator.

What Will It Cost?

"Well," you might say, "it's all very well for schools to have computers, but to have one at home the cost would be exorbitant!" And you would be right ... and wrong! (There are always two sides.)

The suppliers advertise home computers for $299. They are right in that some computers will cost that. What they do not tell you until you are hooked or bamboozled is about the hidden extras.

Your computer can be hooked into your television – if the right connector is there – but you cannot watch television at the same time. And if you want to keep what has been worked on, well you can't – unless you buy a cassette recorder or disk drive to go with the computer – that's another (round figures) $500 for the disk drive – you're now up to $800 and you're not even trying!

The popular Australian MicroBee — a printer is now available especially for it (the Admate DP-80, pictured above).

The sensible, serious student will need a printer to go with his/her computer and disk drive – another $300 at least – $1100 so far.

If the student is sensible and serious – and the family wants to get more than an occasional glance at the TV at three in the morning, you had better add a screen (or monitor) for another $300. We now have $1400!

Software – apart from simple games – starts between $70-$100 and goes up from there. Some computers come with a couple of introductory programs, but you're soon going to want more than that – and the only cheap way to get software is to write your own. Learning to program is worthwhile but a slow process.

Let's imagine we bought a floppy disk drive – we're going to need some disks, aren't we? Disks cost from $35 up for a box of ten. We'll also need some printer ribbons, a printwheel (printing font) and a book or two if a manual and/or lessons have not been provided. All in all, you can't expect to have a fully equipped system without spending around $1800.

So don't be misled by $300 computers. Unless your sole interest is learning to program, you're going to be up for much more than that – eventually, if not with your initial purchase.

If you make the decision to buy one of the smaller 'pocket-type' computers, realise now that you cannot expand its dimensions. You may decide to purchase one in any case as a 'trial' for your children, not being sure that they will continue with this mania. But be aware it will need to be replaced when your child has extended beyond the computer's capacity.

If you decide your child will benefit from a computer, not only now but in the future, then start with the basic prerequisites. What the salesman in the shop will call the 'computer' appears to you to be nothing more than a keyboard which plugs into your television set. This is enough to get started with – provided of course that you have a television – and that you realise from the outset that you could end up fighting with your child as to who uses the television.

Both children and adults spend a lot of time on a home computer simply playing games. Don't, as I initially did, imagine that games are entirely useless ... they are being used constantly now as improvers of co-ordination and dexterity, and apart from the obsessive aspects of games which develop in a minority of children, can be quite useful – especially for younger children. Imagine too, the fun you could all have as a family.

Word Processing

For the primary school child, Logo is well worth considering, and for the high school student it is practically essential, if you purchase a computer, to seriously look at the word processing programs available.

I wondered at first at this maxim, but ▶

on reassessing my children's homework assignment needs, I realised that they are constantly re-drafting the same text. The child eventually becomes bored with re-writing the same words over and over ... the handwriting consequently suffers instead of improving ... the spelling deteriorates ... and in the case of the dyslexic child, immense frustration sets in.

With a word processing package the child initially keys in the text, and then can simply and easily edit that text – a vast improvement when you consider less frustration, improved spelling and English, an improvement in dexterity and familiarisation with keyboard operation.

Once you enter the world of word processing it becomes essential to purchase a printer and disk drive. Cassette machines are less costly and do the job reasonably well, but are slower to use and require good organisation. This does not mean good letter-quality printers of $1500 upwards; as far as the student is concerned, as long as the printing quality is of readable standard and prints to a normal A4 page width, dot matrix printers are perfectly acceptable. The difference between the two is that one uses the single stroke of ink on paper and the other utilises a series of dots to make the letters. Dot matrix printers range in price from $350 upwards.

Although various brands of disk drives and printers will be compatible with your computer, it may be advisable to purchase the brand recommended by the retailer from whom you purchased your computer – and through whom you would have your equipment serviced.

The reason for this is very simple: a service technician today is not necessarily a qualified electronics engineer. He is trained to know a machine thoroughly, generally by various rote learning methods (colour coding, and so on). This means he does not necessarily

know how your machine works – only that if the red wire is not connected to the blue wire it won't work. If you throw an unfamiliar machine his way it makes his job a lot more difficult – in fact, it may even have to be sent to a different company for servicing. This can be both time-consuming and costly.

Another point to keep in mind is that the warranty of your computer may be invalidated by choosing a non-recommended brand of accessory.

This should not happen if your printer, say, is compatible with your other components, but in the business world I have known one particular supplier of dedicated word processors try to get away with not honouring a warranty agreement because the user had not used a recommended brand of diskette! So – beware!

User Groups

Most user groups are very worthwhile joining. Apart from the feeling of camaraderie they engender, they are also productive as teaching units. They are a marvellous mixing ground for parents and children and are, in fact, one of the best levellers for parents I know!

Today, when parents and children are drifting further apart and interests are divergent, user groups provide companionship, self-discipline, conversation (whatever happened to that?), and a closeness of thought between parent and child which may, of course, if only one parent is involved, encourage divorce, but not filial separation!

The availability and standard of service or maintenance is, in my opinion, of more concern than the brand purchased. Whether the brand you bought is, in the case of, say, country buyers, shipped back to Sydney or Melbourne for servicing, or whether the servicing is done on the premises, is of little moment; but it is essential that you check up before you purchase anything not just from the retailer, but from other users, what the service record is like. The same word of mouth selling which prompted you to investigate and purchase brand 'x' will also give you the facts on the service record.

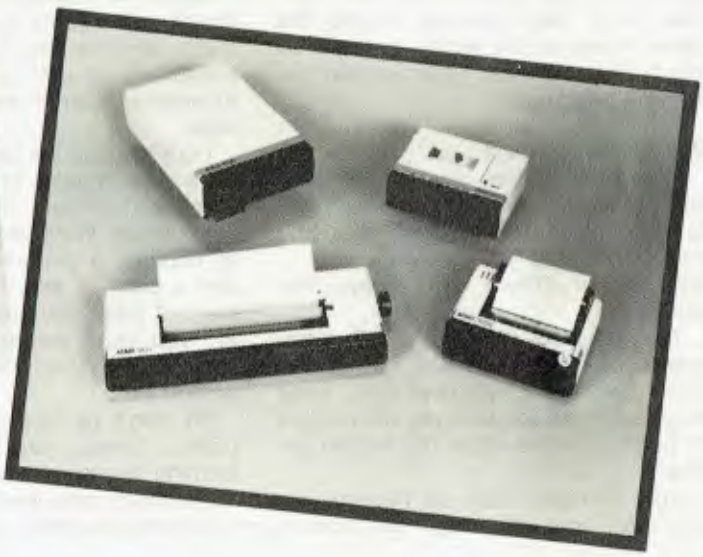
Accessories

Computer accessories range from dustproof disk storage boxes to cleaning kits; they also fall, in the case of home computers, into what the trade calls 'consumables' – a debatable misnomer – which the dictionary defines as "an article intended for wasting, eating or using up". So as far as the home user is concerned, printwheels, disks, ribbons and so on form part of these 'consumables'.

In Conclusion

The key to buying a computer for your children is, therefore, to look at it very much from an educational point of view. The mere fact that games are fun, and that you will be able to do your home accounts or type up your letters, are only additional incentives when you consider the price of a computer plus peripherals.

The advantage a home computer will give to your child in his/her education and development of 'computer literacy' is what is most important, and with the increasingly sophisticated software programs becoming available, maybe kids will even start to see education as fun!❑



Computers such as the Atari 600XL (above) can be used on their own, but once you get into computing, accessories such as printers, cassette recorders and disk drives (right) become very desirable extras.

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Your computer Questionnaire

By Derek Morris

Although questionnaires are not a new concept, they have usually been limited to the insides of women's magazines, and have dealt with all sorts of trivia – until now, when 'Your Computer' presents this opportunity for you to find out whether computing is ***really*** *the right occupation for you.*

THIS BRIEF quiz strays from dealing with the usual topics, and attempts to examine the mind of you, the gentle reader. It will determine if you have the makings of a Zaks, Osborne, or even (heaven forbid!) a Bell. If you have ever wondered how you rate in this industry, now is the time to find out.

The accuracy of this questionnaire is probably equal to that of any other found in women's magazines (draw your own conclusions).

If you pride yourself on an ability to 'see through' most questionnaires then you have met your match. The subtle differences in the choices will leave even the sharpest reader at a loss to tick one answer only. So select your answers wisely and with caution, for your final assessment depends upon it.

After you have answered every question, calculate your score with the table at the end of the questions. This score is then used to determine your assessment. Good luck!

THE QUESTIONS:

(1) Q. Why did you buy a computer? (a) To play video games and get a grasp of programming. (b) For business/domestic use. (c) Myer were all out of train sets. (d) So my children could take a quantitative leap into the future.

(2) Q. What was the main criterion in your selection? (a) Price (b) Availability of software. (c) Value for money (d) All of the above. (e) Ability to interface with LEGO.

(3) Q. If you were given $500 to spend on your computer you would: (a) Buy software. (b) Buy a peripheral (modem, printer, monitor, etc) (c) Ask for more money in order to buy a hard disk. (d) Trade in your present system.

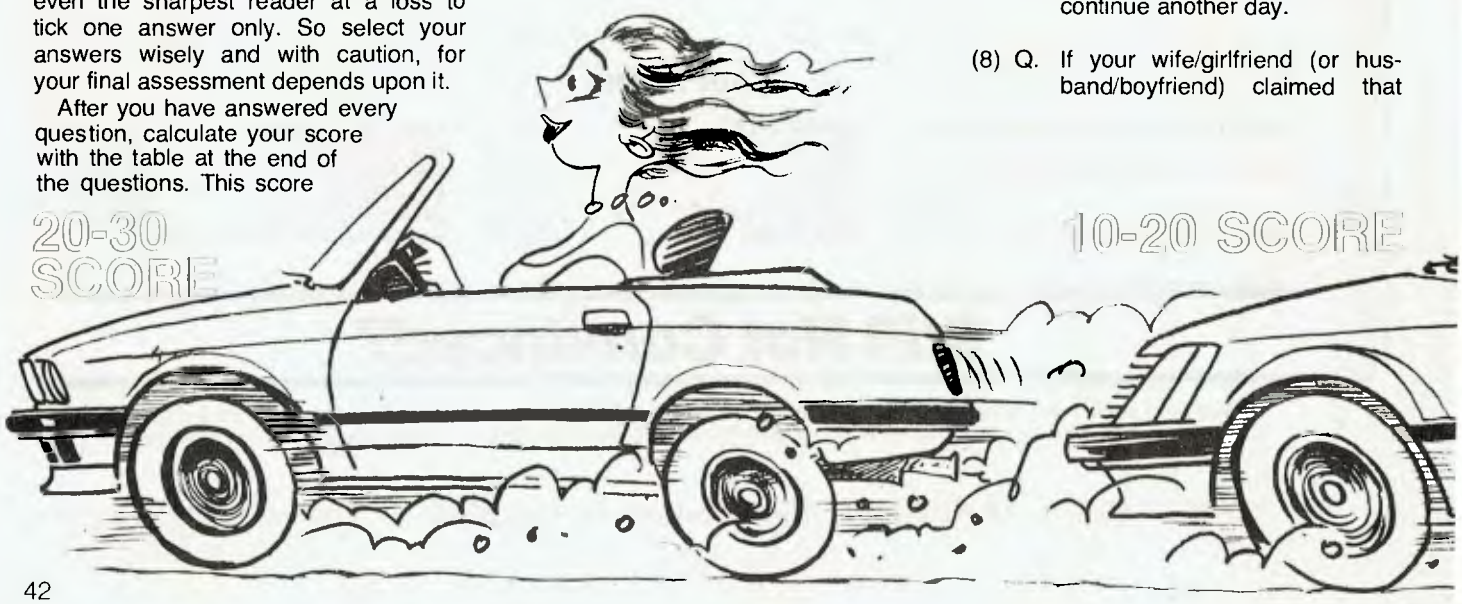
(4) Q. How often do you use your computer? (a) 0-2 hours a day (b) 2-4 hours a day (c) More than fours hours a day.

(5) Q. Do you find you save time by owning a computer? (a) Yes, definitely (b) No, I spend more time writing and debugging. (c) Yes, a lot of my time was spent searching for my favourite recipes. But all that has changed since I bought my ZX81...

(6) Q. Which group of items best describes what surrounds your computer? (a) Notepaper, several pens, reading lamp, cassettes, disks, etc. (b) Four telephone lines, the Financial Review, pocket pager, and a Concorde boarding pass. (c) Twelve bubble gum wrappers, two joysticks, a Phantom comic book, and 180 degrees of ham-and-pineapple pizza.

(7) Q. If you spent all night typing a listing, then found it was full of errors, you would: (a) Sift through the listing and iron out all the errors. (b) Consider it an omen and scrap the program. (c) Save what you had done to continue another day.

(8) Q. If your wife/girlfriend (or husband/boyfriend) claimed that



20-30 SCORE

10-20 SCORE

you spent more time on the computer than you do on her/him (no pun intended) you would: (a) Press for a divorce. (b) Spend more time with her/him. (c) Try and get her/him interested in computers.

(9) Q. Late one night, the office heart-throb pays you an unexpected visit whilst you are typing out an assembly listing. You would: (a) Drop everything! (b) Tell her/him to go away. (c) Charm her/him to death, then get her/him to dictate the source code to you.

(10) Q. After a terrible car accident you awake to find you have lost both your hands. You would: (a) Spend the rest of your life designing a voice decoding I/O device. (b) Cry, sulk and then cry. (c) Try to stay awake when the matron deals the next hand.

(11) Q. Your dog chews up your latest software purchase. You would: (a) See the humour in it (b) Take the software back to the retailer and test his after sales service. (c) Rub his nose in it (the dog's, not the dealer's).

(12) Q. If you were stranded on a desert island the one thing you would pine for would be: (a) Rescue. (b) An Osborne, plus mains. (c) A July '83 issue of *YC*. (d) All of the above.

YOUR SCORE

Having answered all the above questions, calculate your score by using the following table.

Q1. a)2 b)3 c)0
Q2. a)1 b)1 c)2 d)3 e)0
Q3. a)1 b)1 c)3 d)2
Q4. a)1 b)2 c)3
Q5. a)1 b)3 c)0
Q6. a)3 b)1 c)0
Q7. a)3 b)0 c)1
Q8. a)1 b)3 c)2
Q9. a)1 b)3 c)2
Q10. a)0 b)-2 c)3
Q11. a)1 b)3 c)0
Q12. a)1 b)2 c)3 d)0

Analysis

20-30

A very good score indeed. You have one of two rare qualities, both admirable. You have either got what it takes to be a front-runner in this competitive industry, or you are a damn good cheat.

Either will assure success at anything you care to turn your hand to. You are probably a Virgo, drive a small BMW, and hope to own an aircraft someday.

10-20

An average score, but nothing to be ashamed of. You probably work for someone who scored about 23, and do so very well. Once again you have fallen into the 'average' bracket, as you have in the past. Only you know how true this is.

However, don't despair, there is still hope – if you had the good sense to mark the questionnaire in pencil. Go back and adjust your answers to attain a score total of just over 20. This will show real character, and serve as a testimony to your new-found position at the top.

This is your one opportunity to shake off your past and take a step forward in the rat race – grab it! You probably voted for the Democrats, drive a beige Commodore, and are a Taurus.

0-10

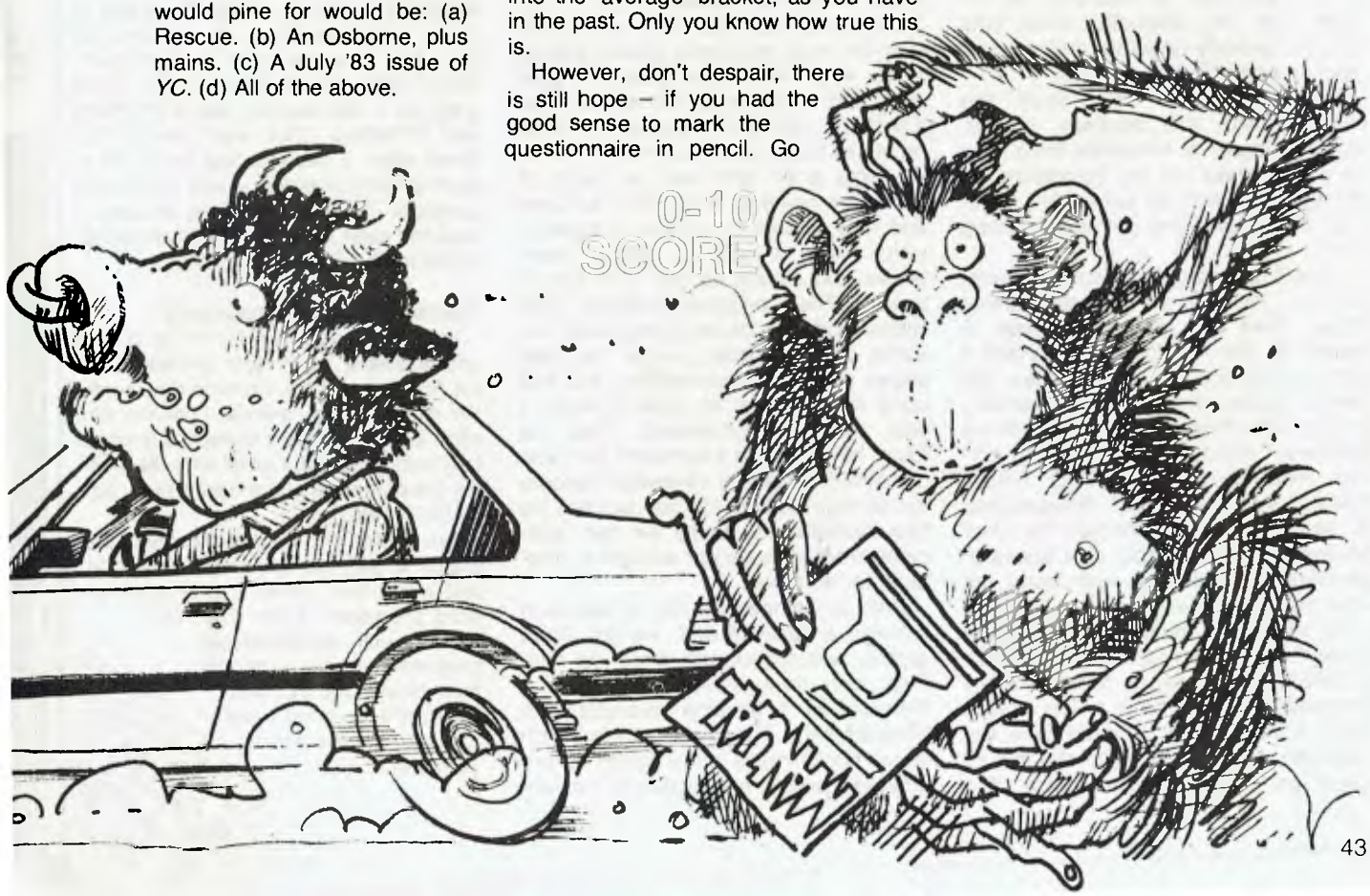
Go look on top of your wardrobe. There you will find the box for your computer, and in it will be a book you forgot to read. The manual!

There is more to life than joysticks and game cartridges. Read the manual and you may surprise yourself – you might even be able to write your own Munchkin game, or develop a new blend of bubble gum.

Don't let your ranking in this questionnaire disturb you, though. You have a very important role to play in this industry, one you are excelling at.

Without you, many wouldn't be able to meet the lease payments on their 323is and Cessnas. This complex inter-relationship has probably escaped you, and it is possibly best left that way.

Chances are you completed this questionnaire whilst waiting in some doctor's surgery, years from now – the fact that you attained such a low score rules out the possibility that you are a regular reader. ❑



Innocent in Computer-Land

Lesley Zolin belongs to one of those classes least likely to become involved with computers; to use her own words, she's "a middle-aged, married, innumerate lady" - but she's certainly having fun with her Commodore 64.

THE MACHINE keeps telling me "? SYNTAX ERROR IN 80" and I've rewritten line 80 four times and checked the commas, the spellings, the Os, the 0s, the Is and 1s. Nothing alters that damn-fool statement. I even tried changing the spelling of words in a string, just in case I'd inadvertently typed in some command I didn't know about. Line 80, so far as I can see, is absolutely no different from the preceding three data lines I've already typed in, and the program runs beautifully with them.

So what next? Shut down the machine (with the program, so far, saved on tape), let the whole thing stew for a while, take out my frustrations on the typewriter and go back later, to reread line 80 and find out what's wrong with it.

There'll be something wrong in there, for sure. I've just got to that irrational stage where I'm tempted to type in something like *"Well, tell me where it is!"* and expect an answer. Like the time, a couple of weeks back, when I engaged in a heated altercation with my husband. I insisted that a possible correct response to "? REDO FROM START" would be "YES". Reason (that is, him) prevailed. I checked the User Manual – which on this rare occasion provided the answer – and found out what the problem was.

So what's this middle-aged lady who doesn't even understand the rudiments of BASIC doing playing around with a computer? She's having fun, that's what. A month back, I would have laid odds (and I'm no betting female) that I'd never get on the business end of a keyboard. Now I spend hours alone with the Commodore 64, learning to give it directions simple and logical enough for it to follow.

Filling In The Background

Perhaps I'd better fill in a bit of background. I'm innumerate (my maths training consists of year nine arithmetic almost thirty years ago) and didn't think I'd ever have success with anything even vaguely mathematical. My only contact with computers is through an engineer husband who has used them and taught programming to other people.

When he talked about it, I took it for granted I couldn't understand, so I didn't. He taught our kids some of the fundamentals of flow-charting and program-writing while I was doing some of those traditional female things in the background. He and the seventeen-year-old have had some heated discussions about what the school's Apple could and could not do and how to make it perform. I didn't think computers would be of use to, or usable by, me.

I write a bit, and use up reams of paper on rewrites. I research subjects and make notes on scraps of paper – which have a habit of getting themselves lost among all the other bits of paper. That engineer-husband also writes, and gets just as annoyed as I do about all that paper usage. He also knows about word processors, and has sung their praises for quite a while. I was becoming convinced. Then he found he could use a simulator for some machinery tests that otherwise become too complicated for the test facilities he has available. Suddenly we had sufficient excuses to go out and get a computer for ourselves.

With a Commodore 64, a television set and a cassette unit, we set about getting acquainted with what we had. First, work through the User's Manual, then (when it became available) the Programmer's Reference Guide. Both these books made more sense to the engineer, who'd come across the language before, than to me, so I equipped myself with a couple of elementary texts on BASIC as well.

Strangely enough, because it was all so new to me, I picked up some of the special quirks of the Commodore which he would have overlooked. His approach was more like: "How do I present a particular command in such a way that it will be accepted by this computer?", whereas mine was "Is it possible to give a particular command and how do I do it?" More often than not, though, my reaction as I worked through the manual was more like: "Gee whiz! Imagine that! Look what I can do now!"

There have been mixed reactions, of course. Like the time I spent two whole nights working on a program to move a ball diagonally across the screen. The whole thing was an elaborate routine of cursor, space and print instructions. Oh boy, was I pleased with that program. Then next day I read more about graphics – and learned about PEEKing and POKEing. That was one of the times when I realised I've got a lot to learn about computers – and this one in particular. Somewhere along the way, I wouldn't even be surprised if I picked up a little maths. It could be useful.

Forced To Write Programs

Luckily, we were unable to get hold of any software, apart from games, when we first brought the Commodore home. We didn't buy any games. I call the situation lucky because it forced us (particularly me) to spend a bit of time discovering the potentials of the bare (dare I say, BASIC?) machine.

I've written and debugged simple programs to play games, make lists, open and close files, even set up a simple word processor. Each time, I've begun with demonstration programs in the manual, then played around with them; it's a good way to learn about the machine.

Of course, it also makes one realise how desirable some of the available software is. The mind boggles (this one, anyway) at the thought of plugging in a cartridge or loading from a disk, and then heading straight into manuscript retouching or correction with no other preliminaries.

Some time in the future, we'll add a disk drive and printer; the limitations of tape and screen by themselves soon showed up. The word processor will be added as soon as we can locate the software. Meantime, the simulator program has already been written up and made use of.

Until the software arrives, I'm still learning about programming. By now, the logic seems logical and I've given up most of my tendencies to regard the screen as a home for an independent-thinking, logical, rule-ridden demon. The mysteries of opening and closing files are becoming less obscure. The possibilities of merging files, or extracting information from them for use in another project, are something I believe to exist, but I've still got to work out how to do it.

Meantime, the learning's fun – despite the frustrations. Maybe because of them. I could enrol in a course and learn all about it from the experts, but that would offend my independent spirit. It would also take up time I'd otherwise spend at my own keyboard. What's more – think of the sense of achievement I'm going to have when I finally discover what's wrong with line 80. All by myself. ❑

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Don't Panik!

'Panik' was rated among the Top Five games programs for the TRS-80 a very short time after its release in the US. Eduardas Grigonis tells us why.

PROBABLY THE best program I have obtained for some time is Fantastic Software's 'Panik', now distributed by Cosmic Software in Sydney (available in Adelaide from Micro-80). It is easy to see why 'Panik' rated in the Top Five games programs for the TRS-80 in the US shortly after its release!

The basic premise of the game is fairly simple. You are trapped in the building site of the evil Mzors and have to kill as many as possible before they exterminate you. The building site consists of five levels, which are connected by ladders of various lengths. These ladders can connect from two to four levels. The layout varies from game to game but you will soon notice similar patterns repeating.

The Mzors come in various types. The Medas (100 points) and the Onk (125 points) are the least dangerous of your adversaries. These are capable of shooting at you and also of creating energy barriers. The Garf (200 points) is capable of the same tactics but can also move between floors without using the ladders. This can be particularly devastating when they fall on you from the floor above or ascend from beneath you.

Roshe is a particularly nasty creature. He can't shoot or climb ladders but if you are on his level he will come after you. He is also made of new Mzorian steel and you have to shoot him fifteen times before he is destroyed. Roshe will also destroy any energy units he finds on his floor. Hits against Roshe are accumulative, so you can hit him a few times and come back later, provided you don't get hit in the meantime, which means you have to start again! Each shot to hit Roshe is worth 50 points, so you get a total of 750 for destroying him.

The meanest creature you are likely to encounter is Gork. Although he can't shoot back, he is of particular concern as he keeps on replenishing the supply of Medases, Onks and Garfs. Gork will require eight hits to kill, each of which is worth 150 points, so he is worth 1200 points altogether.

Alone With Roshe ...

The game starts with just you and Roshe on particular levels. The first thing to happen is the appearance of a Mothership which disgorges Gork. You can destroy the Mothership (800 points) but only if you are on the second-to-top level, can get to the laser cannon (which is always on that level) in time and have energy units in hand. If you hit the Mothership before Gork appears it will come back shortly and try again.

You commence the game with no energy units in hand. These will appear on the floors of the various levels and you can obtain them simply by moving over them. Each location may contain from one to nine energy units. If you use ▶

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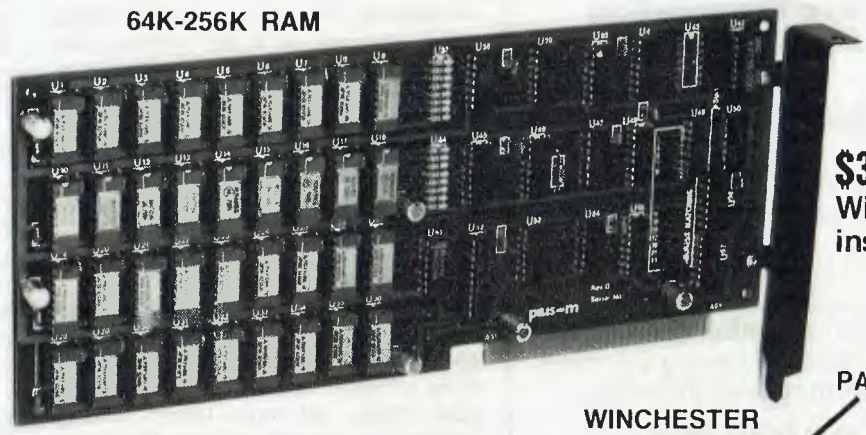

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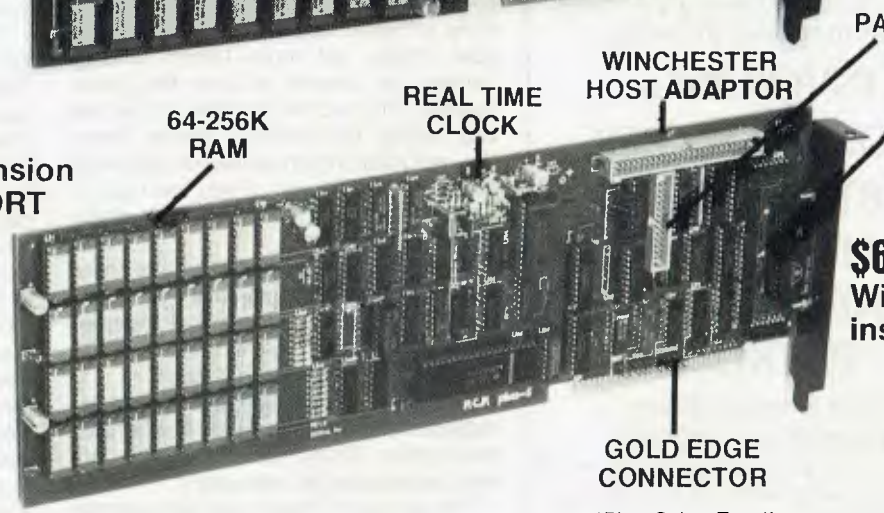

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all the energy units more will appear. If, however, you have run out and no more appear this means you have missed some elsewhere in the site. The extra units will appear only when all the previous allocation have been either used by you or destroyed by Roshe.

There will certainly be times when you need to leave a location in a hurry but aren't able to get to a ladder. In these situations you can use your Matter Transporter. This will use up five energy units, so if you try it and nothing happens check to see if you have the energy available. Unfortunately, modern technology has its flaws, and there is no way of determining where you will reappear. You may come back at exactly the same place or end up in an even worse situation.

It Keeps Getting Harder

For the first 10,000 points or so you will have it easy. You simply wander about causing havoc and killing everything in sight. Once you get past that point things get more hectic. Energy barriers get created all over the place, making it more difficult to get to that last vital energy unit which is always there. You will also find creatures occasionally shooting back at you. If you can't get to a ladder then use the transporter; otherwise you're dead!

If you make it to 30,000 points there is an extra surprise awaiting you. The Mothership will bring along another Gork, thereby making life, and the retention of it, that much more difficult.

Each time you destroy Gork he will be replaced shortly afterwards. If you have more than 10,000 points, Roshe will also be replaced as necessary.

The tactics of 'Panik' are fairly simple: destroy everything in sight while taking the occasional pot-shot at Roshe or Gork and running like crazy. If you get the chance, find a quiet location and have a rest while you consider your next move. When you get down to the last few energy units, consider wasting them against the wall so you can get a larger supply when the next allocation appears. Provided you do this in an empty level it is not as dangerous as it appears.

Operating The Game

Each level is about two to three times the width of the TRS-80 screen. As you move left or right the screen will scroll as appropriate. Graphics are exceptionally smooth.

The keyboard controls are standard. You can move left or right with the corresponding arrow keys, and to move up or down ladders you do the same. In order to climb ladders you have to be right in the centre of them. When I took 'Panik' along to a User Group meeting to test the reaction, this factor was the only one which caused any real concern. Firing is accomplished with the space bar, whereas the Transporter is activated with the Enter key.

I prefer to use the Alpha joystick rather than the keyboard (for the 'Stickeroo' equivalent contact Micro-80). Movement is achieved by moving the joystick in the appropriate direction. Firing is obtained with the Fire button, while the Transporter is activated by pressing the joystick forward and pressing the Fire button simultaneously.

Tape Version

I have the tape version of 'Panik' and have never experienced any loading difficulties. The program is self-starting, and includes voice effects as well as normal sound effects. The disk version apparently also includes an advertisement for Fantastic Software by way of voice effects.

The tape version comes with two high scores (32,500 and 29,900) built in. There is provision to record the Top Ten scores while you are playing, so although it will take some practice to beat the built-in scores you will still be able to see the results of your progress. My highest scores so far are 25,500 using the keyboard and 31,800 using the joystick. I'll beat that top score yet!

The tape version of 'Panik' will set you back $28.50 but is worth every cent; the disk version costs an extra $5. The disk version will retain the Top Ten scores between playings. Whether or not I would recommend the disk version would depend on whether you were able to clear the Top Ten scores if desired. I have had a rather unpleasant experience from (I must stress) another source. I obtained the disk versions of what are quite good games. These disks store the current Top Ten, but there is no provision to delete these scores, so now I have racked up a few presentable results, I can't get anyone else to play the damn things.

Also, the two disks in question can't be backed up. To quote from the documentation, "As an important part of the operation of your computer, you have the ability to make copies of programs in your computer. This includes the ability to make additional back-up copies of these programs to protect your investment." Sorry, folks! Whoever wrote the programs in question couldn't care less about your investment!

Anyway, enough whinging for now. Let's get back to 'Panik'; I highly recommend it. Contact Cosmic Software for details if you're interested (incidentally, the tape version can be made to work from disk with some difficulty). ❑

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Microbee Graphics
Part 2

In the first part of this article Mike Oborn considered the full range of the Microbee's standard graphics in both high-res and low-res modes and how they are displayed on the VDU. Part 2 now goes into the use of the programmable character generator on the Microbee.

WITH THE standard graphics behind us it is now time to consider the role of the programmable character generator (PCG) in creating the Microbee's five graphics modes. This piece of hardware not only controls the high-res and low-res modes but also UNDERLINE, INVERSE and PCG, which we have not yet considered. It is this PCG which is responsible for the Microbee's graphics limitations.

Programmable Character Generator

We saw in Part 1 of this article (*Your Computer*, November 1983) that high-res graphics characters (including the normal ASCII characters) are formed in a character space of eight dots across by 16 down, as shown in Figure 1. Each dot (or bit) is represented by a number between 1 and 128, with the value of each row (one byte in the Microbee's memory) being represented by a number between 0 and 255 – 0 if no bit is to be displayed, up to 255 if all dots in that row are to be displayed.

Each PCG character can therefore be represented in memory by 16 bytes, each of which represents a combination of dots that is to be displayed in each row to form the desired shape. With 128 characters available in the PCG, it takes 2048 bytes (2K) to represent these characters.

The required bytes are POKEd into memory using DATA and READ commands. PCG memory starts at memory location 63488, with the first character occupying bytes 63488 to 63503. The following program demonstrates the technique of loading a PCG character into the first character space in the PCG RAM. Figure 2 shows how the DATA statement was calculated.

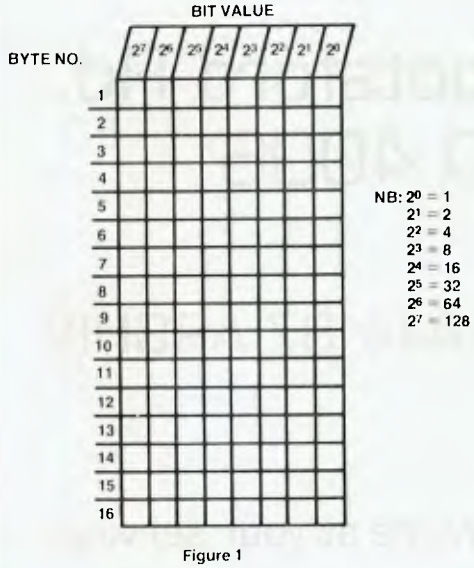


Figure 1

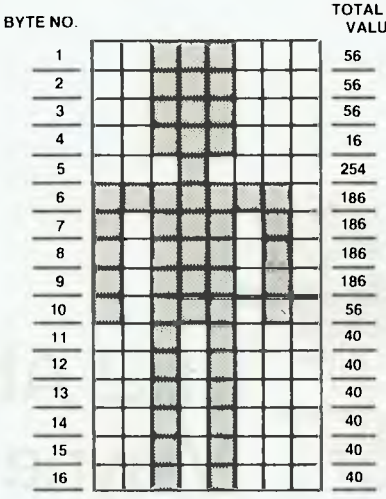


Figure 2

The program:

```
100 DATA 56,56,56,26,254,186,186,
186, 186,56,40,40,40,40,40,40
110 FOR I = 63488 TO 63503
120 READ A: POKE I,A
130 NEXT I
140 PCG: CLS
150 POKE 61440,128
160 NORMAL
```

In line 150 we have used the POKE command to place the PCG character in the first location in screen memory (remember the top left-hand character space?). The reason for this choice is that we cannot PRINT the first 32 ASCII characters (remember?) and therefore must resort to the POKE command. However, when using the POKE command we must add 128 to the ASCII code because the PCG characters occupy the second 128 characters in PCG RAM. Nevertheless, with the PRINT command, PCG characters are coded 0 to 127 – clear?

The following program will demonstrate this by using the POKE command to print the PCG RAM contents in the top four rows of the screen. Initially the inverse character set occupies the PCG RAM where your own PCG characters will be loaded, and these are the second 128 characters listed. (NB: If you have not reset your Microbee since using another graphics mode, the PCG RAM will contain those characters, not the INVERSE set.)

```
100 CLS
110 PCG
120 FOR X = 0 TO 255
130 POKE 61440 + X,X
140 NEXT X
150 NORMAL
```

By substituting the following line in the above program, the difference in the PCG RAM using the PRINT command can be seen – the inverse set is listed first.

```
130 CURS 0 + X: PRINT CHR$(X)
```

Now we have seen how PCG characters are created, it is time to use them in graphics displays.

PCG Graphics

We have already used the POKE, CURS and PRINT commands to place PCG characters on the VDU. The other command used is PEEK.

While there is a limit of 128 programmable characters, there is no limit on the number of times any of these characters can be placed on the VDU to build up a picture – in other words it could be reproduced 1024 times to fill

each character space on the VDU! Also, a larger character can be built up over several character spaces – either side by side or in rows. The program in Listing 1 will draw a duck which extends over six character spaces – three in row 8 and three in row 9 immediately below the row 8 characters.

In line 160 we have POKEd the DATA into ASCII codes 65 to 70 (remember it could have been 33 to 38, when the PRINT characters would have been "!"#& %&", for example). Movement can be achieved by a FOR NEXT loop increasing the value of X to a maximum of 61 (the end of the line). Character 'A' created in the program has all bits off – it is a blank.

To create the impression of movement it is necessary to remove the first character from the VDU and replace it with another character in the next character space. This can be achieved in one action by ensuring the overlaid PCG character covers the first character while still moving one character space. By adding a trailing blank ('A') to each PRINT command ('AABC' and 'ADEF') we will ensure that none of the earlier duck is displayed.

The movement created by the above program will not look smooth. To improve this, the PCG character which overlays the earlier one should provide some natural movement (for example in the legs and tail). The smaller the movement, the more PCG characters, but also smoother graphics. Additionally, moving less than one character space each time will smooth out the graphics display but will require even more PCG characters to handle this movement. All that is needed is patience, plenty of graph paper and of course a maximum of 128 PCG characters.

High-Res Limitations

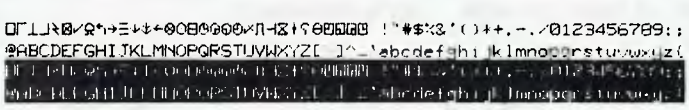
Now that we have a better understanding of the PCG characters, we can consider how the programmable character generator creates high-res graphics.

To demonstrate, the following program draws a line around the VDU ▶

```
00100 CLS: LORES
00110 FOR X=20 TO 100 STEP 4:SET X,10:SET X,40: NEXT X
00120 FOR X=10 TO 40 STEP 4: SET 20,X: SET 100,X: NEXT X
00130 FOR J=1 TO 1000: NEXT J
00140 PLOTI 20,10 TO 20,40 TO 100,40 TO 100,10 TO 20,10
00150 NORMAL: END
```

```
00100 DATA 56,56,56,16,254,186,186,186,186,56,40,40,40,40,40,40
00110 FOR I= 63488 TO 63503
00120 READ A: POKE I,A
00130 NEXT I
00140 PCG: CLS
00150 POKE 61440,128
00160 NORMAL
```

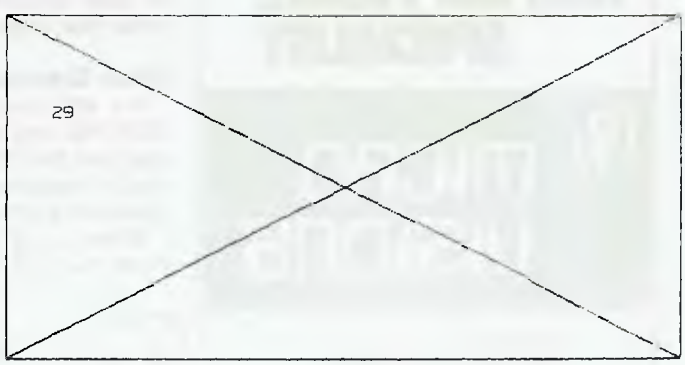
```
00100 CLS
00110 PCG
00120 FOR X=0 TO 255
00130 POKE 61440+X,X
00140 NEXT X
00150 NORMAL
```



```
00100 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
00110 DATA 0,0,0,0,0,7,8,17,18,17,16,8,8,8,8,16
00120 DATA 0,0,0,128,192,160,28,8,176,32,64,128,128,64,32,16
00130 DATA 0,0,0,1,30,8,6,1,6,5,8,4,7,8,0,0
00140 DATA 16,32,192,0,0,2,9,4,134,122,34,199,0,0,0,0
00150 DATA 16,16,16,32,64,128,0,128,64,48,8,4,184,64,0,0
00160 FOR I=63488 +65*16 TO 63488+71*16-1
00170 READ A: POKE I,A
00180 NEXT I
00190 CLS:PCG
00200 X=1
00210 CURS X,8: PRINT "ABC"
00220 CURS X,9:PRINT "DEF"
00230 NORMAL
00240 END
```

Listing 1 (above) produces the duck shown on the left. Below and left are other samples of the Microbee's graphics.

```
00100 HIRES
00110 PLOT 0,0 TO 0,255 TO 511,255 TO 511,0 TO 0,0
00120 PLOT 0,0 TO 511,255
00130 PLOT 0,255 TO 511,0
00140 CURS 5,5: PRINT USED
00150 END
```



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screen and then joins the diagonally opposite corners. The command USED in line 140 returns the number of PCG characters used in PLOTting this display – 29 in all.

```
100 HIRES
110 PLOT 0,0 TO 0,255 TO 511,255
TO 511,0 TO 0,0
120 PLOT 0,0 TO 511,255
130 PLOT 0,255 TO 511,0
140 CURS 5,5: PRINT USED
150 END
```

For there to have been only 29 PCG characters used, even though the lines PLOTted in this program must have entered around 280 character spaces, means that where the PCG character created by the PLOTted line is a duplicate of another PCG character used earlier, a new PCG character is not generated, but the first PCG character is reused. This can be demonstrated by PEEKing into the screen memory at any location and seeing what PCG character has been created for that character space. The following can be input in the IMMEDIATE mode to return the ASCII code of the PCG character created.

```
PRINT PEEK(61444)
```

The ASCII code returned was 131. If once again in the IMMEDIATE mode we input:

```
PRINT CHR$(131)
```

the output is one character space of the top line of the VDU showing that segment of the PLOTted line.

It is possible to run out of PCG characters quite quickly drawing circles or by PLOTting random lines. Therefore to reduce the number of PCG characters used in high-res mode, either restrict your graphics to a portion of the screen or draw straight lines where possible, rather than angled lines or curves.

Other Graphics Modes

We still have not covered the UNDERLINE and INVERSE modes. These also use the PCG RAM and are more easily explained now that we have covered the other modes more fully.

When using the UNDERLINE command the last byte of each character loaded into the PCG RAM is coded 255 - remember, all dots turned on? This means all characters will have the bottom line in that character space turned on (that is, an underline). *All* output is underlined until the command NORMAL is encountered.

Under the INVERSE command, as the normal ASCII characters are loaded all bits are inverted. *All* output is then in inverse video until once again the NORMAL command is encountered.

Colour Graphics

At last! You can almost hear owners of VIC-20s and its ilk cry. Not yet! is the reply. Although the colour option has been publicised for some months (and has been subject to a price rise – up $10), it is still not available to the general public. Therefore it is not possible to cover this graphics attribute yet!

In spite of this, its claimed resolution of 512 by 256 dots, each individually colour codable in any of 26 colours (foreground and background), will certainly be something to crow about. However, as with the BBC Microcomputer, the output is RGB plus sync, which is not compatible with the normal TV. Ideally an RGB monitor is required, which is very expensive, or the family TV can be converted (goodbye four-year warranty) at an originally estimated $50 (now $60 to $70). This latter method still enables normal operation of the family TV when not being used with your Microbee.

For the present, however, Microbee users must settle for black and white graphics.

Conclusion

This completes our look at the Microbee's graphics. Obviously the choice of the programmable character generator provides some limitations on the Microbee's graphics, but it does allow finer resolution of graphics displays.

When this high-res display is in colour, the chunky displays of, say, the VIC-20 will pale by comparison. In the meantime, these limitations should lead to ingenious solutions both from a hardware and a software point of view. In fact the very expandability of the Microbee should encourage developments in this area from Australia's own cottage computer industry. ❑

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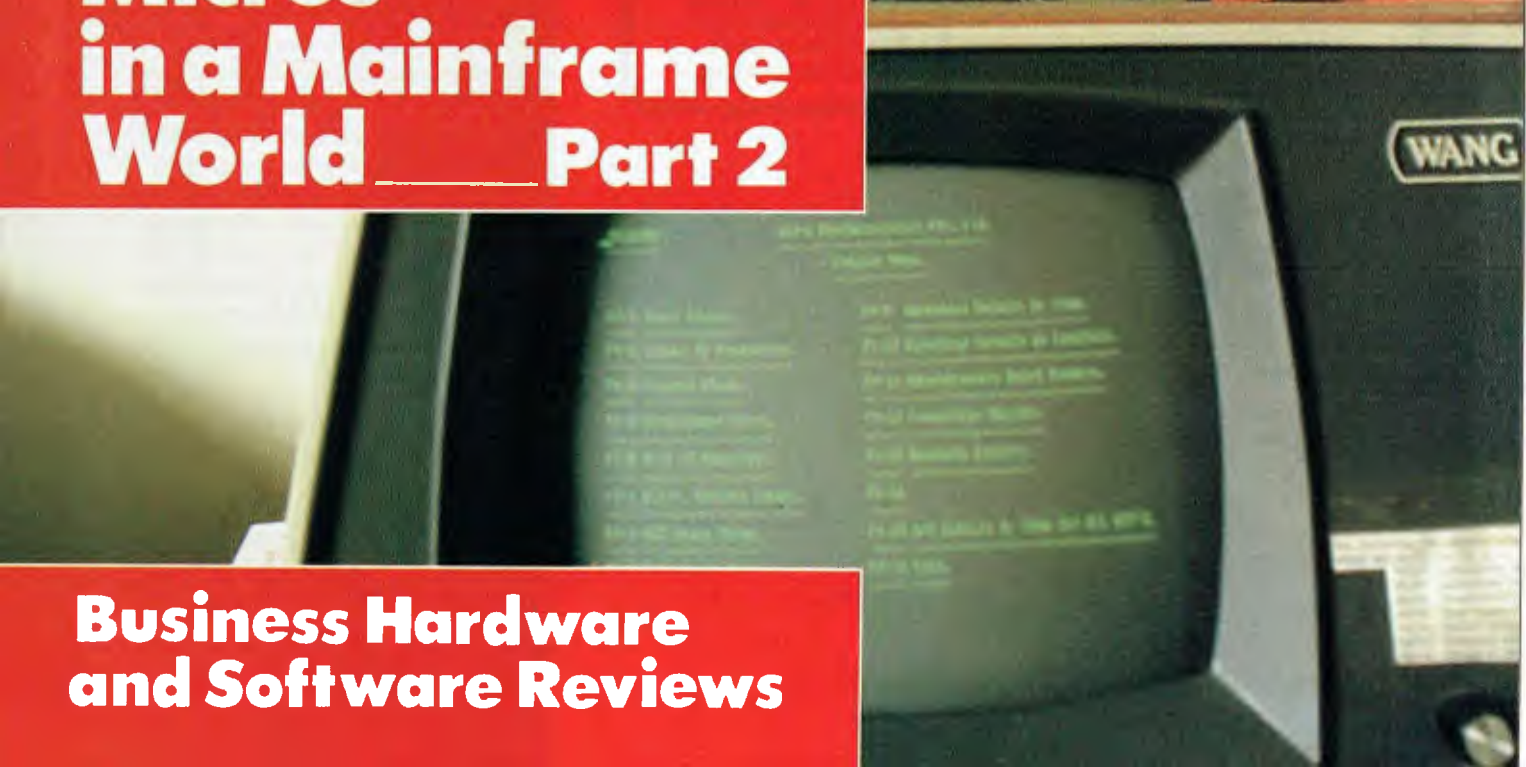
MAGAZINE

Micros in a Mainframe World ____ Part 2



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BY FRANK LIEBESKIND

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BY COLLYN RIVERS

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WANG
apple

In the first part of this article, published in Your Business Computer's October issue, Frank Liebeskind looked at the use of micros or 'personal' computers to help management with decision-making and planning. In an organisation with an existing data processing department, however, these new 'desktop' computers should be compatible with the existing computer power in order to make the maximum use of the resources available.

Micros in a Mainframe World

BY FRANK LIEBESKIND,
PAST PRESIDENT,
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SYSTEMS ANALYSTS

Part 2

I consider the use of personal computers within all companies as inevitable because of the help they give to management in making everyday ad hoc decisions, planning, forecasting and quick access to information. Other reasons for the likely introduction of PCs to management offices include:

- The decreasing cost of micros and their increasing capacity.
- The growing number of user friendly packages and data management systems that run on micros.
  The growing familiarity with computers; it seems to me that the mystique associated with computers is diminishing rapidly.
- Independence in processing, and not being affected by adverse response time, other priorities and scheduling as often occurs in a shared environment.
- Dissatisfaction with computer services departments' response to individual requests for small programs and quick changes.

When evaluating a microcomputer for professional use, several features should be taken into consideration. These features can form a kind of checklist to ensure that a micro will meet the needs of management; see Tables 1 and 2.

Hidden Problems

Users wanting micros must be aware of the hidden computer management problems associated with 'owning' a PC. There is more to operating a PC than just running applications. For this reason, the computer services department should provide a support centre facility for users of PCs that should make available the staff, tools and training for end-user computing.

Part of the strategy for use of micros and part of the training courses for users must be aimed at *avoiding* a lot of little 'computer departments' within the company, as each user does his own thing and sets up his own computer management infrastructure.

Hidden problems should be the responsibility of the computer services department in co-operation with the user. Examples of hidden problems the user is unlikely to want to get involved in include:

- Implementing program and operating system updates.
- Negotiating licensing and trial use agreements.
- Managing 'shared' data (the information centre concept – see Part 1).

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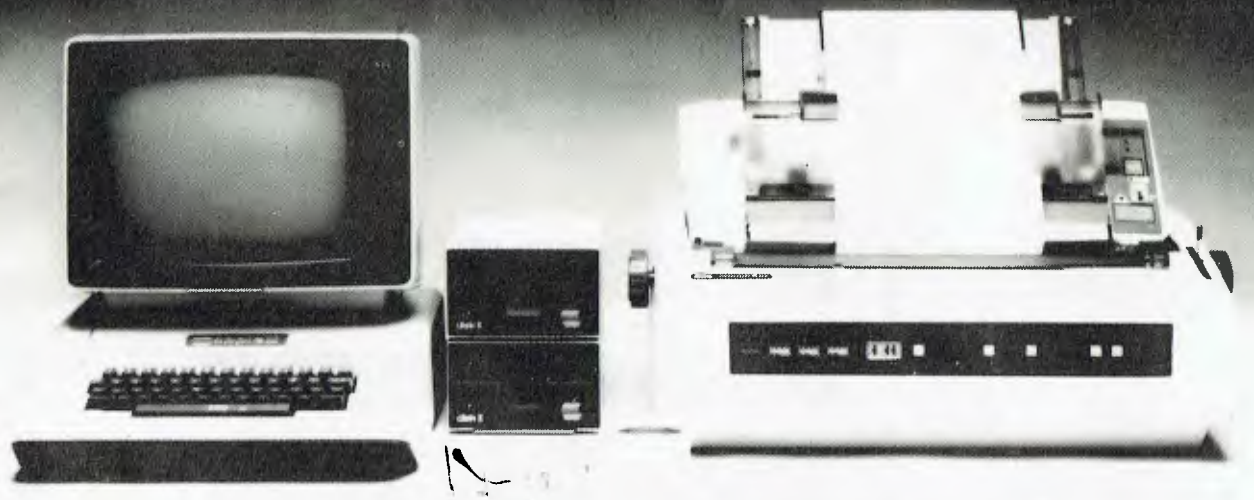

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The Micro Centre

A concept worth considering is the setting up of a micro centre. A micro centre is a place where a user (or potential user) can come to try out a personal computer.

The micro centre should not aim at being a service bureau where users reserve time on the micros, but a demonstration, training and software/hardware evaluation facility. The micro centre would have various PC hardware and software packages, including word processing, spreadsheet and database software.

Ultimately, when PCs are well established and accepted throughout a company, the micro centre could be expanded to include the following facilities:

- Assistance hotline to provide users with telephone help or a meeting to resolve any PC problems.
- An exchange of programs developed by users (a software library).
- A newsletter giving tips and encouraging good microcomputing practices; this is designed for experience sharing.

Training Courses for Users

It could be the intention of the computer services department to conduct training sessions for all levels of management and any other interested PC users.

Education might take the form of half-day, hands-on tutorials on the PC, using business and software tools, for up to five persons at a time. More generalised sessions (for up to twenty people) could cover PC considerations, including:

- Maintaining the integrity of corporate data.
- Data security and privacy considerations.
- The necessity for standardisation where possible (hardware, languages, operating systems, and so on).
- Housekeeping considerations.

People interested in micros should not necessarily wait for the above internal courses; participation in outside courses should be encouraged.

There is an increasing number of courses available on the use of micros. Table 3 is a list based on advertising brochures recently received in the mail, but enquiries in your local area will certainly reveal many more. ▶

CHECKLIST FOR PROFESSIONAL COMPUTERS

Multi-function capability must be able to:

- Perform, as a stand-alone processor, data processing, word processing, spreadsheets, custom-developed programs, and so on.
- Perform as a dumb terminal able to access a host computer for data entry, enquiry purposes, and so on.

It is a great advantage to be able to download data files from the host for processing by the micro. When doing this, the host maintains the master (data) files but makes them available to user micros for independent analysis work, freeing the host's capacity from this kind of use.

Multi-processing capabilities are an advantage:

- 8-bit micros are capable of processing only one function (task) at a time.
- 16-bit micros have the internal memory and instruction sets to support more advanced operating systems to handle multi-tasking (as in a traditional minicomputer).
- It is likely that the memory capability of an effective PC will be 64K minimum, with expansion to 1M (about one million bytes) for high-level PCs (for example, Apple's Lisa has 1M memory, DEC's PC350 has 0.5M).

Storage for a PC should be of the following capacity:

- At least two floppy disks with a *minimum* of 300K of total storage. Anything less is useless for these purposes and no better than a toy. Or:
- A hard disk (probably non-removable) that fits into the space of one of the floppy disks and has 5M-10M capacity, plus one floppy disk (for back-up and data transfer, and so on) with a capacity of at least 500K.

The screen display, for comfortable (and ergonomic) use, should have the following **capabilities:**

- 24 lines of 80 characters on at least a 10" (25 cm) screen (giving a total of 1920 characters on the screen). This is just over half of a typical A4 typed page.
- Colour combinations are usually white or green characters on a black or dark green background; amber or blue characters on a dark background are starting to be available now and are believed to be less tiring on the eyes.
- Colours have begun to appear (typically at an extra ($1000), although they must be used carefully to avoid confusion and eyestrain.
- If many graphics packages are to be produced, a display/computer combination that has at least 200,000 points on the screen (for example 500 by 400 pixels — picture elements) is best; a 140,000-point screen is classed as 'low resolution', but acceptable.

The input keyboard **should be:**

- Detachable with a 1 m flexible cable so that the user can move the keyboard to a comfortable operating position.
- Have hard and/or soft function keys for customised specific-purpose use.
- A normal typewriter-like keyboard, usually with an IBM Selectric layout.

Printed output will vary with requirements and budget:

- $700-$1000 slow-speed (80 cps) dot matrix printer attached to the PC is useful for personal use in draft quality only.
- Secretarial use or presentation-quality work will require letter-quality printing (usually a daisywheel printer, $1500+).
- Graphics may require a special graphics plotter or printer ($3000+), or a high-quality dot matrix printer with graphics capability. Colour is even more expensive.

Data communications is a **necessary** feature for a PC:

- At the very least, the PC should provide asynchronous transmission at 300 baud (via acoustic coupler or modem).
- The PC should have the software to allow it to communicate with other PCs and/or with a host computer for file transfers (both sending and receiving — for example data files, electronic mail).
- The PC should have dumb terminal-type operation to interact with the host.
- The PC should be able to operate in both a public (Telecom) and private network environment (for example a local area network: Ethernet, ARCNet, Wangnet and so on).

Table 1.

The new generation of personal computing software is now emerging, providing an integrated work environment that facilitates easy transfer of data from one appliction to another.

With Apple's Lisa several tables can be displayed as though they were papers on a desk.

Justifying a Desktop PC

The criteria for justifying the purchase of a PC should not be significantly different from the criteria for justifying a supermini; that is, it must be justified either on economic savings or improved management information, which may be impossible to quantify in dollar terms.

However, because of the nature of micros and the rapid technological developments in the microcomputer area, a payback period of two years should be taken as a guide. Also, because of the fast technological obsolescence of micros, a three-year depreciation period is recommended (normally four or five years for a supermini).

Technological obsolescence in the supermini computer market is not as fast as for micros. New chip technology (64K chips have replaced the 16K chip) will make the mini process faster, but the high investments made by both the computer manufacturer and the client (investment in applications software as well as hardware) has resulted in new technology and new operating systems for minis being introduced on a more planned, gradual and evolving basis.

The micro market has been characterised by aggressive introductions of new technologies to give the micro product a competitive edge in a market where there are over seventy different suppliers of microcomputers in Australia.

Tangible savings will come from:

- Staff savings (existing staff or not having to add staff to do a new function).
- Other DP costs saved, for example bureau costs.
- Not having to upgrade facilities on the host computer.

Intangible savings will come from:

- Improved manager productivity (estimated as 15 per cent improvement as a result of the use of a PC as a tool).
- Avoiding the cost of making a wrong decision by being able to evaluate more alternatives as a result of improved management information.

If the benefits of using a PC are mainly intangible, the low cost of a micro should still result in a favourable decision to purchase; in the same way one can ask oneself: "Can I do without my calculator?" The growth phenomenon in micros (2.5 million units in the USA in 1982, and estimated as 3.5 million in 1983, of which 75 per cent are in business use) has largely been justified on the intangible basis of "I want one, I need one".

The PC must be justified and considered as a business resource. The cost of a telephone on each desk is difficult to cost justify, but is nonetheless now considered a necessary office tool.

Software and Applications for PCs

The new generation of personal computing software is now emerging. To date, PC software has not allowed a user to integrate data or transfer data from one application to another. That is, previously a user had separate packages for spreadsheet modelling (such as Supercalc), a graphics package, a word (text) processing system (for example Wordstar), and a database management system. To integrate these products was either difficult or impossible. This, in my opinion, is a limitation to the experienced user.

However, new-generation software is providing an integrated work environment facilitating easy transfer of data from one application to another. Visicorp's VisiOn (designed to run on IBM and DEC micros) is an operating environment product that manages Visicalc, Visiplot and Visiword applications on the screen at the same time. Thus a user can develop a model (using Visicalc), select elements of the model for graphic presentation (via Visiplot), and can type in textual comment (using Visiword), all on one screen. Previously, all these functions had to be done separately, with no interaction.

Other advanced software packages integrating word processing, electronic spreadsheet modelling, business graphics and database functions (and telecommunications) are Context MBA (around $800) and Lotus 1-2-3 (around $600). Using such packages the display screen can be divided into several 'windows' to show different information simultaneously. Display is in high-resolution mode (requires 16-bit CPU and bit-mapped screen technology) for clarity and

quality of graphing.

Apple's new 16-bit micro, the Lisa, has been designed with this integrated data environment as its base, with the concept of 'multiple windows' on-screen as a basic feature.

The following is a summary from a specialised newsletter on PCs:

"Among features Lisa and VisiOn are said to share is the ability to request information by pointing to words and symbols on the screen, rather than by typing in commands or code words. A handheld device, known as a mouse, is used in both cases to point, say, to a tiny filing cabinet when asking for a data file.

"VisiOn and Lisa will also make it easier for users to switch from one task to another – today an awkward job at best on may personal computers. Both products permit all applications – word processing or spreadsheet – to share common data and instructions. A graph can be generated and inserted into the text of a letter without changing disks and re-entering data.

"With both VisiOn and Lisa, several tasks can be displayed on the screen at once as though they were papers lying on a desk. Visicorp and Apple say a user is able to move paragraphs and figures from one set of papers to another using their products."

Software De Facto Standards

1. Operating Systems

CP/M, the single-user operating system from Digital Research, has sold millions and become one of the de facto industry standards. Its multi-user brother, MP/M, is being adopted by many manufacturers for both 8-bit and 16-bit multi-user applications.

The semiconductor manufacturers Intel, Zilog and Motorola have adopted Unix, both to get their 16-bit technology to market faster and to provide a route to their 32-bit offerings. MS-DOS is also highly regarded and an accepted standard operating system for 16-bit micros, especially since the introduction of the IBM-PC, which uses PC-DOS, a slight variant of MS-DOS.

There are other operating systems, including the manufacturers' own (for example DEC's POS). But most manufacturers construct their micro to process industry-standard operating systems so they can take advantage of the software developed (for example word processing and spreadsheets) for those de facto industry-standard operating systems. ▶

PC FUTURE FEATURES

Some of the following features are already being offered with certain personal computers.

Additional functions:

- Calculator mode that can be initiated at any time.
- Typewriter mode that duplicates the operation of a typewriter.
- In all likelihood, the telephone will be integrated with future workstations, so that the workstation can do automatic dialling of memory-recorded phone numbers, etc.

Input options:

- The 'mouse' (available on the Xerox Star and Apple's Lisa, and optionally on some other micros) is a handheld device for cursor movement. It is much faster and easier to use than cursor control via the keyboard.
- Touch-sensitive screens (for example, touch the screen for menu selection).
- Voice recognition and voice response, which are closer for practical use than may be realised.

Display and output options:

- Large internal memories (in the megabyte range) will support bit-mapped displays for higher-resolution screen display. The advantage of bit-mapped displays is 'what you see is what you get'. Text can be shown on the screen just as it will be printed by typestyle, size and so on. Graphics will be high quality with little or no 'staircasing' that is seen on curves and slanted lines in most of today's graphic displays. Conventional display screens are 'character-mapped' displays.
- The feature of multiple 'windows' on display is an important part of the new approach to making micros suit managers' work methods. Multiple windows (available on some systems today, for example the new VisiOn on IBM and DEC, and Apple's Lisa) enable executives to look at and evaluate several types of information concurrently (such as a graph, text, and a section of spreadsheet details).

Table 2.

EXTERNAL EDUCATION COURSES

Management Technology Education, (02) 264-3821: Visicalc - Use and Applications, $200, one day.

Institute for International Research, (02) 929-0544: How to Use Microcomputers as a Business Tool, $675, two days; How to use Visicalc for faster, easier budgeting and cash flow forecasting, $645, two days.

Computerland, head office (02) 264-8200: Various courses designed for the beginner.

Tandy computer shops: Various courses.

The Desktop Workshop, (02) 29-5032: $140, one day.

The Computer Shop, (02) 517-2999: Various courses - for example, Introduction to PC using Visicalc and Multiplan, $80-$100.

Many evening courses.

Table 3.

New IBM Micros are Mainframe Compatible

Howard Karten
US Correspondent

Ever-eager to meet new and developing market needs, at the end of October IBM rolled out the two newest models in its PC line. The two new IBM products – designated the IBM-PC XT/370 and the 3270 PC – are aimed mostly at business users with large-scale computers in-house (such as the IBM 4300, 308X, 303X and 370s), but could conceivably find use by some smaller users.

The XT/370 is functionally a PC-XT with a new PC virtual operating system and a circuit board that allows it to run the 370 BAL instruction set. At a rare (for IBM) New York City press conference introducing the two devices, IBM officials explained that the XT/370 will run most VM/CMS BAL application software unchanged; they also indicated that run speed of the new unit is about half as fast as the slowest 4300 currently made.

In addition to running the 370 BAL instruction set – contained in three proprietary chips – the XT/370 can also simultaneously run a standard PC application and operate as a 3277 terminal.

The 3270 PC was regarded by most observers as a dramatic device – as well it should be, given its compatibility with IBM's 3270 mainframe terminals, colour display oriented toward windowing (*a la* Lisa) and the ability to run seven programs at the same time.

The unit's keyboard, a cross between the standard PC keyboard and that found on a 3270 terminal, reminds one of nothing so much as a magnificent, four-manual keyboard used on a Baroque organ. Indeed, the effects will be comparable; an agile, proficient 3270 PC user should be able to do awe-inspiring feats of digital legerdemain.

More prosaically, the 3270 PC allows users to connect simultaneously to a maximum of four separate processors or programs (such as IBM's CICS or IMS, used in large-scale installations), as well as running a standard PC application and two 'notepads'. Users will be able to move data from one application to another; the various processes are controlled by beautiful eight-colour windows, which can be made smaller or larger, moved around the screen, overlaid by other windows or hidden ... and so on.

Reverberations

It is probably not an overstatement to say that IBM's announcements will have reverberations throughout the business and computing worlds for years to come.

"I think the announcement is incredible," observed Bob Fertig, president of Enterprise Information Systems in Greenwich, Connecticut, and a 20-year observer of 'Big Blue'. Fertig cited several strategic results of the announcement which he called highly significant, including neutralising some major PC competitors such as Apple's Lisa, expanding revenue growth from the PC and XT, possibly aggravating current shortages of electronic components, and stimulating market demand for more powerful, intelligent workstations.

Not all observers here thought products like Lisa and other competitors would be drastically hurt. "Lisa still obviously offers more, and has third-party software participation, but in terms of price, the 3270 PC is quite competitive," noted another market watcher.

Many observers thought that companies with IBM plug-compatible products could be seriously hurt. For example, Lee Data Corp of Minneapolis makes a 3270-compatible terminal that also provides PC capabilities. Given the prices of IBM's latest offerings – US$9000 to US$11,700 for the XT/370 and US$4300 to US$7180 for the 3270 PC – and the capabilities of those products, firms such as Lee Data could be in serious trouble.

However, several other parties could benefit as the ramifications of the announcement become more widely known. For example, the XT/370 means homebound or handicapped programmers could more easily work at home, without having to tie up an expensive phone line to test their programs.

The 3270 PC could well be a boon to vendors selling training services. Although IBM includes a tutorial with the hardware (called 'Helper'), several DP managers here wondered about the skills that would be required to make full use of seven processes or programs at once. In addition, there is obviously a big difference between knowing how to manipulate the keys, colours and windows according to the manual, and knowing how to do it to best effect.

First US shipments of the new products are expected early in 1984; as yet there is no news on when we could expect to see them in Australia. ❑

▶

2. Development Aids

Database management systems are now appearing on micros. These provide PCs with a very powerful tool, as data can more easily be accessed for analysis purposes. This is a quantum step forward for micros, as only three years ago file handling software on micros was in the 'crude' category.

An example of such database software is INGRES ($500-$1000); this same software is priced in the $30,000 range for minis. Other popular database software available for micros includes Oracle and dBase II.

There is now an increasing number of fourth-generation languages (4GLs) becoming available for micros. Many of these have come from software running on larger minis. User-11, a PDP-11 4GL, is available as User-Base on micros using the Oasis operating system.

The electronic spreadsheet can be considered a development tool because of its flexibility. It is not restricted to processing dollars, and is the most popular kind of financial planning package.

Uses for the PC

It is difficult to define all the uses for a PC. Once a manager has access to a PC it is normal for him/her to start to create productive uses for it. People often don't know at first what to do with 'their own' computer; what should be understood is that if you don't understand the concepts of 'cash flow' or 'net present value', for example, then the PC will not solve these problems for you. However, education on 'what you can do with a PC' could be profitable for a company introducing them to its management.

The user of the PC, not the computer services department, will determine the best use for a PC as a personal tool. The message from experienced PC users in business is to be patient but persistent in finding new uses for their 'personal' computer; the greater the familiarity with the system, the more innovative applications will come to mind.

Some specific uses apart from spreadsheets, graphics and word processing could include:

- Sales call planning.
- Statistics.
- Rights and contracts.
- Scheduling.

Whatever the application, the growing trend of user friendly development tools, together with database software, will enable users to be creative in developing productive uses on their PCs. ❑

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Lotus 1-2-3

Lotus Development's 1-2-3 is an exceptionally popular package; in its first three months it sold 60,000 copies and has been the talk of many business lunches attended by people one wouldn't think had any knowledge of software.

It is one of the first of the new generation of integrated software; in other words, it combines the functions of a Visicalc-type spreadsheet with a simple database manager, *a la* Visidex, and a graphics package.

1-2-3 is supplied on five disks, all of which have to be initialised with a copy of PC-DOS or MS-DOS, depending on which computer you're using. Lotus licenses the product for specific computers, so that there is one version for the IBM-PC and Compaq (a very close clone), and another for the Hyperion (not quite so close), while another version is believed to be in development for the new Otrona Attache 816. There is no generic MS-DOS version.

While the product runs under MS-DOS, it is copy protected, so the master disk must be in the A drive when it is started, even if the files have been transferred to a hard disk. Presumably, the software looks for a particular pattern on the disk and will only boot if it finds it.

The approved way of starting the system is to insert the master disk and type LOTUS, which puts the user into the Lotus Access system. This offers the user a menu of possible things to do: 1-2-3, File-Manager, Disk-Manager, Print-Graph, Translate and Edit. By either typing the initial letter or moving the cursor (by means of the arrow keys) over the command and typing return, the user can move on to the next level of the system.

Most of the time, the user will simply type return to go straight into 1-2-3. The disk drive whirrs for a few seconds, then the screen displays a copyright notice, and pressing return moves the user into the 1-2-3 worksheet.

Big Worksheet

The worksheet is bigger than most, at a theoretical maximum of 256 x 2048. Bear in mind, however, that even using single-precision floating point, such a worksheet would require 2 Mbytes of RAM, which is almost four times the capacity of the IBM-PC.

Like most earlier spreadsheet systems, 1-2-3 is based on a system of VisiCalc-like commands, which start with slashes. These are as follows:

- /C(opy): Copies entries to new locations
- /D(ata): Used to enter data, sort, select records from a database
- /F(ile): Used to manage disk storage, load and save worksheets, and read text files into the worksheet
- /G(raph): Used to display a graph, set graph type, enter legends, set axes and save graph as a file
- /M(ove): Moves entries to a particular location
- /P(rint): Sets print format parameters, headers and footers, and prints worksheet to either printer or file
- /Q(uit): Quits 1-2-3
- /R(ange): Miscellaneous commands that format, erase, name, justify and protect a range of entries
- /W(orksheet): Miscellaneous commands to set global defaults, insert and delete rows/columns, freeze titles, split window display and set column width

As soon as the user types the initial slash, the prompt line changes to show the major commands, with the cursor over the Worksheet option. Typing return at this stage will accept the /W command, or again, the user can move the cursor or type the initial of the command.

At each stage the second prompt line displays the sub-options which apply to the option on which the cursor is placed. So initially it looks like Figure 1...
and the second row of commands applies only to the Worksheet option. Moving the cursor to Range will change the display to that shown in Figure 2.

At first, being used to Supercalc, I found this a bit confusing, but after a while I found it a very logical and helpful system and am now quite used to it.

The Worksheet and Range commands distinguish between global operations affecting the entire worksheet and those affecting a single cell or range of cells. Thus the command to erase the entire worksheet is on the Worksheet prefix, while to erase a single cell or group of cells, the /R command prefix is required. This means that some command sequences are longer than with VisiCalc, but they are simpler to use, particularly with the prompting from 1-2-3.

Added Graphics Dimension

1-2-3 includes all the usual spreadsheet commands such as replication, row and column insertion and so on. Even as a straight spreadsheet it is very effective. However, when one adds the dimension of graphics to it, it becomes very powerful indeed.

The /G option leads to a sub-menu of graphics commands. Most of these simply establish parameters for the subsequent graphing. For example, the graph must be defined as a line, bar, stacked bar, pie or X-Y graph, and at

Les Bell has been a disciple of spreadsheet programs since the time he had to write a BASIC program to calculate discounted cash flows. Here he looks at the latest and greatest – Lotus 1-2-3.

least one range of data values to be plotted must be supplied. Even with this minimal information, 1-2-3's /GV (view) command will display a presentable graph.

If you have both a monochrome and a colour monitor, 1-2-3 will display the graph on the colour display (in up to three colours) while leaving the spreadsheet on the monochrome display. With only the colour graphics adaptor, 1-2-3 will clear the screen and then draw the graph, obscuring the worksheet display. Pressing any key will restore the worksheet to the screen.

Up to six sets of data can be placed on the graph concurrently, each appropriately labelled using the command sequence /GOD (Graphics, Options, Data-Labels). The graph itself may be titled and the axes labelled, a grid optionally overlaid, and the 1-2-3 automatic selection of scales also overruled.

The result of this can be some very neat-looking graphs indeed, though they tend to be on the simple side (you don't always need all that power).

1-2-3 can display graphs in colour, but unlike MBA, cannot display graphs on a split screen for comparison purposes. The graphics facilities are driven by commands, rather than functions stored in a cell, but remember that the macro facility mentioned below can provide automatic generation of graphs if required.

1-2-3 can drive both printers with dot-addressable graphics and plotters such as the HP-7470 or Sweet-P. It does this by storing graphs in separate files, which can then be printed by a separate program called PrintGraph, which is accessible through the Lotus Access System Menu.

Lotus Functions

1-2-3 has all the usual functions, broken into several categories, as shown in Figure 3.

This is a comprehensive list of functions, reading more like a programming language than a spreadsheet.

The database functions are used when 1-2-3 is operating as a database rather than a spreadsheet. A database is a cell range consisting of one or more columns and at least two rows: a column represents a field, and a row is a record. Data can be sorted over a range based on both ▶

Figure 1.

```
A1:                                                          MENU
Worksheet Range Copy Move File Print Graph Data Quit
Global, Insert, Delete, Column-Width, Erase, Titles, Window, Status
```

Figure 2.

```
A1:                                                          MENU
Worksheet Range Copy Move File Print Graph Data Quit
Format, Label-Prefix, Erase, Name, Justify, Protect, Unprotect, Input
```

Figure 3.

```
Mathematical Functions

@ABS(x)                    absolute value
@ACOS(x)                   arc cosine
@ASIN(x)                   arc sine
@ATAN(x)                   2-quadrant arc tangent
@ATAN2(x,y)                4-quadrant arc tangent
@COS(x)                    cosine
@EXP(x)                    exponential
@INT(x)                    integer part
@LN(x)                     log base e
@LOG(x)                    log base 10
@MOD(x,y)                  x mod y
@PI                        pi
@RAND                      random number between 0 and 1
@ROUND(x,n)                round a number to n decimal places
@SIN(x)                    sine
@SQRT(x)                   square root
@TAN(x)                    tangent

Logical Functions

@FALSE                     the value 0 (false)
@TRUE                      the value 1 (true)
@ISNA(x)                   true if x has the value NA
@ISERR(x)                  true if x has the value ERR
IF(cond,x,y)               the value x if cond is true, y if it is
                           false
Special Functions

@NA                        not available
@ERR                       error
@CHOOSE(x,v0,v1,..vn)      select argument value
@HLOOKUP(x,range,offset)   horizontal lookup
@VLOOKUP(x,range,offset)   vertical lookup

Financial Functions

@IRR(guess,range)          internal rate of return
@NPV(x,range)              net present value
@FV(pmt,int,term)          future value
@PV(pmt,int,term)          present value
@PMT(prn,int,term)         payment

Date Functions

@DATE(year,month,day)      no of days since 31 Dec 1899
@DAY(date)                 day number
@MONTH(date)               month number
@YEAR(date)                year number
@TODAY                     today's date

Statistical Functions

@COUNT(list)               number of items in list
@SUM(list)                 sum of items in list
@AVG(list)                 average of items in list
@MIN(list)                 minimum value in list
@MAX(list)                 maximum value in list
@STD(list)                 standard deviation of list
@VAR(list)                 variance of list

Database Statistical Functions

@DCOUNT(input,offset,criterion)    counts the number of all items
                                   in the list
@DSUM(input,offset,criterion)      sums the values of all items
                                   in the list
@DAVG(input,offset,criterion)      average of items in the list
@DMIN(input,offset,criterion)      minimum of items in the list
@DMAX(input,offset,criterion)      maximum of items in the list
@DSTD(input,offset,criterion)      standard deviation of items in
                                   the list
@DVAR(input,offset,criterion)      variance of items in the list
```

a primary and secondary key, in either ascending or descending order.

Once a database has been created, one can then go ahead and query it. There are four query commands: Find, which locates records matching the criteria specified; Extract, which copies matching records to another part of the worksheet; Unique, which extracts records but removes any duplicates; and Delete, which removes matching records from the database. The match criteria include wildcard matching (? and *), formula criteria with logical ANDing and ORing, and others.

Of course, the database is limited to whatever will fit in memory, but it works extremely fast and is convenient to use once you've got the hang of it. It's not so much a database, more a personal list manager.

Combined Database and Spreadsheet

The database facility can be combined with the spreadsheet to submit a list of values to a spreadsheet model and collect the results; for example, to perform sensitivity analysis.

Lotus 1-2-3 is broadly comparable to Context MBA, another integrated software package, but there are important differences between the two packages. The most significant new feature introduced by 1-2-3 is the macro key facility, which allows the user to store a sequence of keystrokes under a single key. This is, in effect, a simple programming capability.

In particular, 1-2-3 allows any named area of the worksheet to contain a menu, which can be presented to the user to make a choice, with the macro program branching according to the user's selection. Combined with conditional expressions, accessed through the /X command, this feature amounts to a full-blown programming language!

1-2-3 has a number of statistical functions, including standard deviation and variance, and it can perform statistical processing on a database. In addition, it provides some primitive functions for dealing with dates and date calculations.

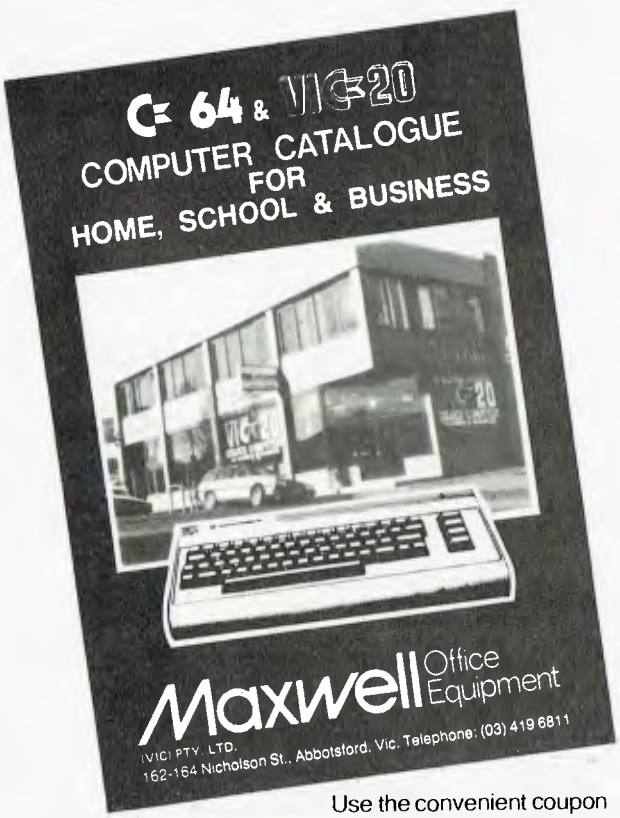
Areas of the worksheet (ranges) can be named, and this allows easy consolidation and linking, as named sections of external worksheets can be read into the current sheet. Finally, 1-2-3 is significantly faster than its main competitor, Context MBA.

1-2-3 has several drawbacks. Graphics cannot be placed on a split screen – though two graphs can be printed together on a single page – and only two windows can be open on the screen at a time, as opposed to MBA's four. 1-2-3 is also weak on iteration, though a primitive form is possible.

Good Documentation

The 1-2-3 manual is excellent; it is professionally produced to a very high standard indeed (puts some magazines to shame!), printed in two colours, and extremely well organised. There's an introductory section, tutorial, more general material, a section on basic skills, and then the major commands are covered in depth. This is followed by appendices, a glossary and an index.

Lotus 1-2-3 is available from a number of suppliers. We were loaned copies by both City Personal Computers and SourceWare, and currently have a copy for the Hyperion from that company. The package costs around $900 including tax. ❑



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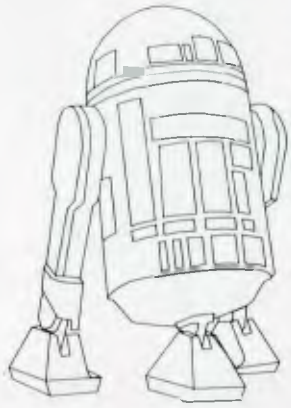
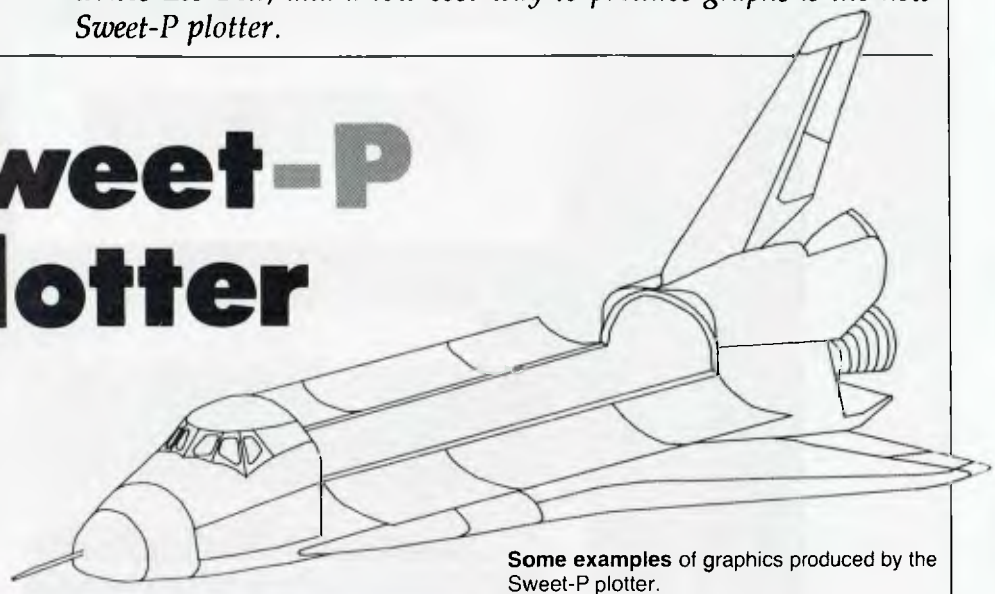
The whole point of using a computer to perform any kind of analysis is to reduce the raw data involved to some format which is easily understood by the user. That's ideally a graphical format, writes Les Bell, and a low-cost way to produce graphs is the new Sweet-P plotter.

Sweet-P Plotter





Some examples of graphics produced by the Sweet-P plotter.

MA x,y;	Move Absolute to x,y
DA x,y;	Draw Absolute to x,y
MR x,y;	Move Relative
DR x,y;	Draw Relative
LN x1,y1,x2,y2;	Line from x1,y1 to x2,y2
PT x,y;	Plot point at x,y
PU;	Lift pen (Pen Up)
PD;	Pen Down
RE;	Reset
HO;	Home
PL n;	Page length (inches)
VS n;	Velocity (0 - 15, 1.4 in/s - 6 in/s)
TX; text;	Text
TD c;	Change text delimiter to character c
CS n;	Character size (1 - 255, 1 = 20 units high by 12 - 16 wide)
MK;	Mark - draws a character around pen position
RO n;	Rotation (0, 90, 180, 270)
AX n,ts,tl;	Draws X axis with length n (1 - 32767), ticks every ts, with ticks of length tl
AY n.ts,tl;	As AX for the Y axis

As many readers will know, my main system is a workhorse S-100 box. It ain't pretty, but it works, and my only regret has been the lack of any graphics capability. While smaller, less powerful personal computers boasted high-resolution colour graphics and the ability to dump the screen contents to a printer, I've had to make do with much coarser and less useful techniques, like plotting asterisks.

But now I've had a taste of something that has given me hope for the future; the Enter Computer Sweet-P Personal Plotter. A little experimenting with this machine showed that anybody can plot, even with a machine as decidedly unimaginative as mine.

The Sweet-P is a small machine, barely a foot by six inches, and only a couple of inches high (that's around 30 by 15 by 5 cm for the metrically minded). It has a central bar, on which moves a pen-holder, while below that two pinch-wheels grip a piece of paper which can be moved back and forth under the pen.

To one side of the bar is a small con- ▶

Commands are sent to the plotter as ASCII text strings, so that Sweet-P is easy to drive from virtually any language. Samples are given in BASIC in the manual, but any language that can drive a printer will do.

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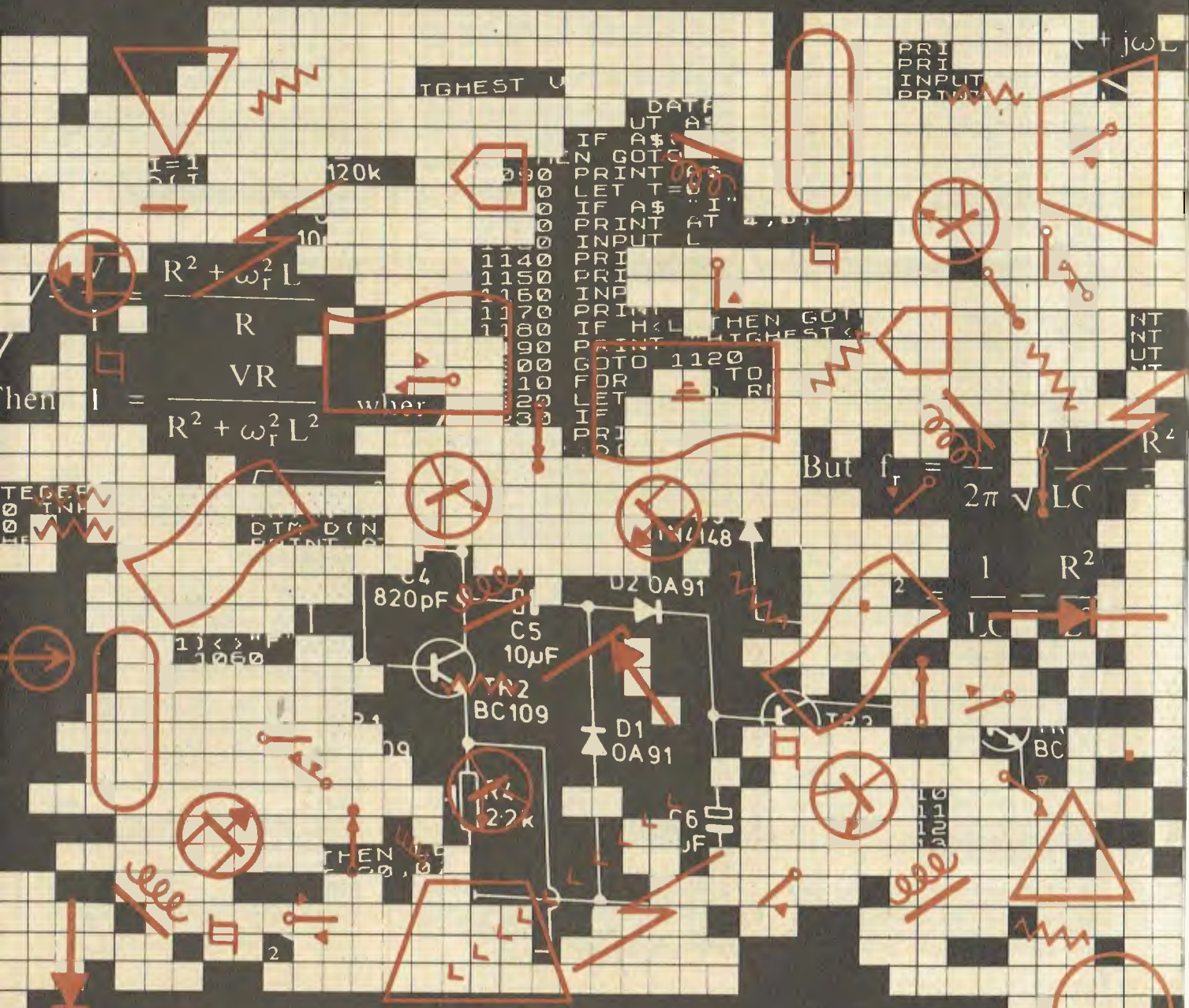

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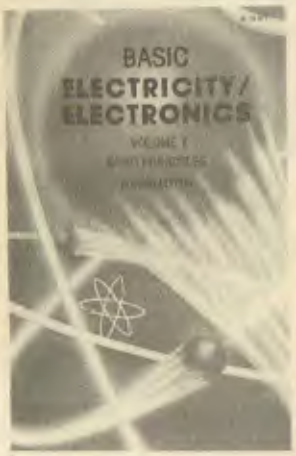

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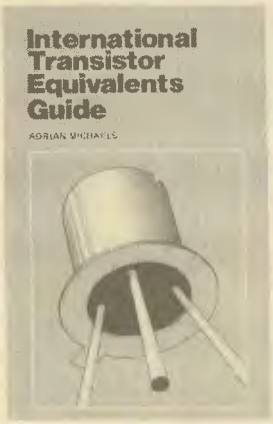

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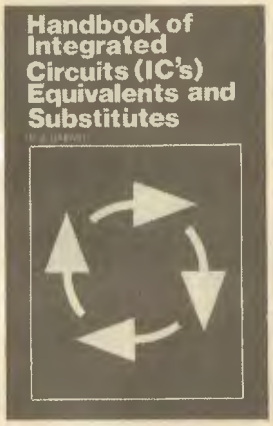
FIRST BOOK OF TRANSISTOR EQUIVALENTS AND SUBSTITUTES
B0025B *$5.95*
This guide covers many thousands of transistors showing possible alternatives and equivalents. Covers transistors made in Britain, Japan, United States, Europe and Hong Kong, and includes types produced by more than 120 different manufacturers.

B0281B



SECOND BOOK OF TRANSISTOR EQUIVALENTS AND SUBSTITUTES
B0026B *$6.25*
Interchangeability data covers semiconductors manufactured all over the world. Immediate equivalents are shown and possible substitutes are included.

PRACTICAL ELECTRONIC CALCULATIONS AND FORMULAE
B0027B *$9.95*
For the practical person's workbench. Bridges the gap between technical theory and cut-and-dried methods which work but leave the experimenter unfulfilled. There's a strong practical bias. High maths avoided where possible.

HANDBOOK OF ICs EQUIVALENTS AND SUBSTITUTES
B0281B *$6.95*
Contains full interchangeability data on more than 9500 ICs with possible alternatives and equivalents shown. Covers many types of digital and linear ICs. Recently reprinted.

INSTRUMENTATION: TRANSDUCERS, EXPERIMENTATION AND APPLICATIONS
B0310P *$19.95*
Presents a basic approach to instrumentation designed to show how measurement systems operate. Includes basic measurement and meter design, potentiometric, capacitive, inductive and resistive transducers.

HANDBOOK OF ELECTRONIC TABLES AND FORMULAS
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Covers solar energy and photovoltaic converters, wind energy, batteries and inverters. Also includes practical solar power supplies with applications for radio communications and low-power electrical systems.

ARRL ELECTRONICS DATA BOOK
B0335R *$5.75*
Covers maths aids and tables, times and frequency, rf circuit data, LCR networks, transformers, filter design, antennas and feed systems, solid state circuits, constructions and testing data. Limited supplies.

INTERNATIONAL DIODE EQUIVALENTS GUIDE
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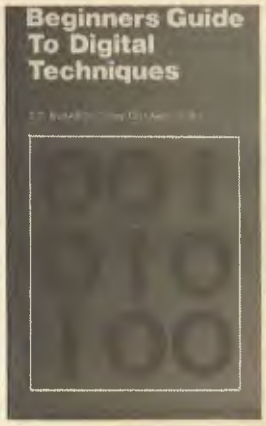
Includes zener diodes. LEDs, diacs, triacs, thyristors, OCIs, photo diodes, display diodes and simple rectifier diodes.

RESISTOR SELECTION HANDBOOK
B0348B *$2.95*
Shows how to combine two preferred values of resistor to obtain virtually any required value of resistance. Includes information about fixed resistors, standard ranges, colour codes and

C0029B



markings, power ratings and resistor calculations.

REACTANCE/FREQUENCY CHART FOR AUDIO AND RF
B0381B *$2.95*
Enables the reactance of any capacitor or resistor to be read off immediately, from 10 Hz to 100 MHz. Also applies to resonant frequencies of LC networks. Limited supplies.

electronics for beginners

HI-FI LOUDSPEAKER ENCLOSURES
C0028B *$4.95*
Data for building corner reflex, bass reflex, exponential horn, folded horn, tuned port, Klipschorn labyrinth, tuned column, loaded port and multi speaker panoramics. Clear dimensioned diagrams included.

BEGINNER'S GUIDE TO DIGITAL ELECTRONICS
C0029B *$4.95*
Covers all essential areas including number systems, codes, constructional and sequential logic, analogue/digital/analogue conversion.

BEGINNER'S GUIDE TO BUILDING ELECTRONIC PROJECTS
C0030B *$6.95*
Enables total beginners to tackle electronic projects. Includes component identification, tools, soldering, building methods, cases, legends, etc, etc. Practical basic projects are included.

HOBBY ELECTRONICS PROJECT BOOK
C0031E *$4.95*
Fifty projects, ranging from very simple ones for complete beginners to more elaborate ones for those with more experience.

HOW TO BUILD ELECTRONIC GAMES
C0032E *$3.95*
Alien invaders, electronic die, sound effects, two-slot car controllers, electronic poker machine and lots more.

HOW TO BUILD GOLD AND TREASURE DETECTORS
C0033E *$3.95*
Tells you how metal detectors work and how to construct the different types of detectors: discriminating, BFO, induction balance and a professional deep-seeking unit.

RADIO CONTROL FOR BEGINNERS
C0034B *$5.95*
How complete systems work with constructional details of solid-state transmitters and receivers. Also included — antennas, field strength meter, crystal controlled superhet, electro-mechanical controls. Section dealing with licensing, etc, is not applicable to Australia.

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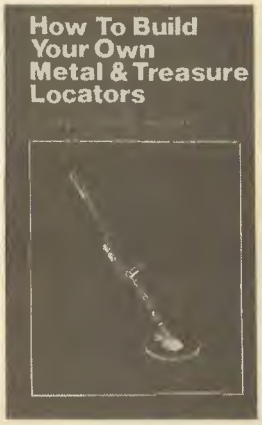

FIRST BOOK OF PRACTICAL ELECTRONIC PROJECTS
C0035B *$4.95*
Full constructional data, circuits, components lists for many practical projects including audio distortion meter, guitar amp, metronome, etc.

HOW TO BUILD YOUR OWN METAL AND TREASURE LOCATORS
C0036B *$6.95*
Electronic and practical details on the simple and inexpensive construction of heterodyne metal locators.

BEGINNER'S HANDBOOK OF IC PROJECTS
C0037P *$19.25*
The novice is guided in mastering the fundamentals of building, troubleshooting and testing electronic projects. In addition to many elementary projects, more advanced ones are included concerning bipolar integrated circuits and medium and large-scale integrated circuits.

ELECTRONIC PROJECTS FOR BEGINNERS
C0038B *$6.95*
This book gives the newcomer to electronics a wide range of easily built projects. Actual components and wiring layouts aid the beginner.

POPULAR ELECTRONIC PROJECTS — BOOK 1
C0039B *$6.95*
A collection of the most popular types of circuits and projects to interest most electronics constructors. The projects cover a wide range and are divided into four basic types: radio, audio, household and test equipment.

ELECTRONIC GAMES
C0040B *$5.95*
How to build many interesting electronic games using modern ICs. Covers both simple and complex circuits for beginner and advanced builder alike.

EASY ELECTRONICS: CRYSTAL SET CONSTRUCTION
C0041B *$6.75*
For those who wish to participate in the intricacies of electronics more through practical construction than by theoretical study. The circuits are based on those from earlier publications but have been modified to use modern components and home-wound coils.

IC PROJECTS FOR BEGINNERS
C0042B *$6.75*
Especially written for the less experienced hobbyist, and offers a range of fairly simple projects based around a number of popular and inexpensive linear and digital ICs. Complete layout and point-to-point wiring diagrams.

SOLID-STATE NOVELTY PROJECTS
C0043B *$4.95*
A number of novelty projects using modern ICs and transistors. Includes a musical instrument played by reflecting a light beam with your hand, water warbler for pot plants, music tone generator, LEDs and ladders game, touch switch, electronic roulette wheel, etc.

D0046B

SIMPLE PROJECTS — VOL 2
C0256E *$2.95*
Contains easy projects plus chapters on construction techniques and useful information on components.

15 SATURDAY ARVO PROJECTS
C0268E *$1.50*
Projects include transistor-assisted ignition, sound bender, radio microphone, simple sound effects, Alien invaders, etc, etc.

ETI PROJECT ELECTRONICS
C0269E *$4.95*
Twenty-six projects for beginners, including battery saver, electronic siren, Morse practice set, FM antenna, etc, etc. Fifth edition.

BASIC ELECTRICITY AND AN INTRODUCTION TO ELECTRONICS
C0311P *$16.95*
Simply worded explanations of electrical symbols, basic electrical laws, direct current, cells and batteries, magnetism, alternating current, distribution, radiation, etc, with many diagrams and illustrations.

HOW TO READ SCHEMATIC DIAGRAMS
C0367P *$10.95*
Covers the various types of electronic diagrams and explains resistors, capacitors, coils, transformers, electron tubes, semi-conductors, switches and relays. An invaluable aid for reading and interpreting the schematic.

constructional projects

ELECTRONIC PROJECTS FOR YOUNG SCIENTISTS
D0045E *$3.95*
PH meter, geiger counter, helium-neon laser, sound-level meter, solar cells, negative ion generator and more.

REMOTE-CONTROL PROJECTS
D0046B *$6.95*
Covers radio, infra-red, visible light, ultrasonic controls. Full explanations are provided so that the reader can adapt the projects for domestic and industrial use.

POWER-SUPPLY PROJECTS
D0047B *$5.95*
Gives a number of power-supply designs, including simple unstabilised types, fixed-voltage regulated types and variable voltage stabilised designs. The designs are all low-voltage types for semiconductor-circuits.

ELECTRONIC HOUSEHOLD PROJECTS
D0048B *$5.95*
Most useful and popular projects for use around the home. Includes two-tone buzzer, intercom, smoke and gas detectors, baby alarm, freezer alarm, etc, etc.

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ELECTRONIC PROJECTS USING SOLAR CELLS
D0049B *$6.75*
Includes a number of projects that benefit from solar power and obviate the problems encountered with batteries, such as weight and bulk, frequency of replacement, and failure when batteries are exhausted.

DIGITAL IC PROJECTS
D0050B *$6.75*
The projects included in this book range from simple to more advanced projects — some board layouts and wiring diagrams included.

BUILD YOUR OWN HI-FI AND AUDIO ACCESSORIES
D0052B *$4.95*
Essential for keen hi-fi and audio enthusiasts. Projects include stereo decloder, three-channel mixer, FET preamp for ceramic pick-ups, mic preamp with adj. bass, stereo dynamic noise limiter, loudspeaker protector, etc.

28 TESTED TRANSISTOR PROJECTS
D0053B *$4.50*
Some circuits are new, others are familiar designs. Projects can be split and/or combined.

MODEL RAILWAY PROJECTS
D0054B *$6.75*
Projects include such things as controllers, signals and sound-effects units. Construction stripboard layouts provided for projects.

CB PROJECTS
D0055B *$6.75*
A number of useful designs include a speech processor, interference filters and a simple CB radio receiver. Stripboard layouts, wiring diagrams and notes on construction are provided.

HOW TO MAKE WALKIE-TALKIES
D0056B *$6.95*
This treatise on low-power transmitter-receivers (walkie-talkies) covers many aspects, from licensing requirements and bands, through practical circuitry and construction to the types of aerials that may be used.

PROJECTS IN OPTO-ELECTRONICS
D0057B *$6.75*
Included are simple circuits using ordinary LEDs as well as more sophisticated designs such as infra-red transmitters and detectors. modulated light transmission and also photographic projects, etc.

SINGLE IC PROJECTS
D0058B *$5.50*
Simple to build projects based on a single IC. A few projects use one or two transistors as well. A stripboard layout is given for each project plus special constructional and setting up info. Contents include low-level audio circuits, audio power amps, timers, op-amps and miscellaneous circuits.

POPULAR ELECTRONIC CIRCUITS — BOOK 1
D0060B *$6.75*
Includes audio, radio, test gear, music projects, household projects and many more. An extremely useful book for all hobbyists, offering remarkable value.

D0264E

POPULAR ELECTRONICS CIRCUITS — BOOK 2
D0061B *$7.75*
A wide range of designs for electronics enthusiasts who are capable of producing working projects from just a circuit diagram without the aid of detailed information.

MINI-MATRIX BOARD PROJECTS
D0062B *$6.75*
This book provides a selection of 20 useful circuits which can all be built on a mini-matrix board which is just 24 holes by 10 copper strips in size. Simple and easy for those with not much experience in electronics.

MULTI-CIRCUIT BOARD PROJECTS
D0063B *$6.75*
All circuits are based on one specially designed pc board. Recommended to the less experienced hobbyist.

AERIAL PROJECTS
D0064B *$6.75*
Practical aerial designs including active, loop and ferrite which are relatively simple and inexpensive to build. The complex theory and mathematics are avoided.

MODERN OP-AMP CIRCUITS
D0065B *$6.75*
A collection of widely varying circuits and projects based on the op-amp ICs.

ELECTRONIC TIMER PROJECTS
D0066B *$6.75*
These may have a high degree of accuracy with quartz control or they may be quite simple designs, using only a. few components. A number of specialist timer projects are car windscreen-wiper delay unit, darkroom timer, metronome, etc.

ELECTRONIC PROJECTS FOR CARS AND BOATS
D0067B *$6.75*
Fifteen fairly simple projects designed for use with 12 V electrical systems but in some cases can also be employed with 6 V and/or positive earth systems.

ELECTRONIC PROJECTS FOR CARS
D0261E *$4.95*
Projects include car alarm, reversing alarm, over-rev alarm, twin-range tachometer, breakdown beacon, intelligent battery charger, etc.

ETI TOP PROJECTS — VOL 5
D0263E *$3.00*
Includes photographic strobe, bucket brigade audio delay line, white line follower, house alarm, etc, etc.

ETI TOP PROJECTS — VOL 6
D0264E *$4.95*
Revised second edition. Projects include theatrical lighting controller, simple intercom, electromyogram for biofeedback use, Series 4000 four-way loudspeaker, etc, etc.

D0356P

ETI TOP PROJECTS — VOL 7
D0265E *$3.95*
Includes geiger counter, AM tuner, laser, simple metal detector, discriminating metal detector, dc power supply, etc, etc.

ETI TOP PROJECTS — VOL 8
D0266E *$4.95*
Includes UHF to VHF television converter, universal process timer, sound bender, percussion synthesiser, etc, etc.

ETI TOP PROJECTS — VOL 9
D0267E *$4.95*
Includes a radioteletype-computer decoder, model railway points controller, universal dc-dc converter, MicroBee EPROM programmer, etc.

SECURITY SYSTEMS
D0294P *$14.95*
Step-by-step instructions show you how to carry out a security survey of your home and then plan, install and maintain an alarm system.

EXPERIMENTER'S GUIDE TO SOLID-STATE ELECTRONICS PROJECTS
D0323P *$9.75*
A large collection of easy-to-follow electronics projects and tests, including experiments with solid-state devices such as solar cells, fibre optics, LEDs and linear and digital ICs.

THE COMPLETE GUIDE TO SECURITY
D0343P *$19.95*
This comprehensive non-technical guide covers locks and alarm systems, security for the home, office, car and travel. Includes practical hints on telephone security, closed-circuit television, ultrasonic and photoelectric burglar alarms and rf bug detectors.

BUILDING AND INSTALLING ELECTRONIC INTRUSION ALARMS
D0356P *$16.95*
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BUILD YOUR OWN ELECTRONIC EXPERIMENTER'S LABORATORY USING ICs
D0384B *$2.75*
Projects include a simple audio frequency oscillator, a TTL pulse detector, a simple square wave generator and a high impedance voltmeter. Limited supplies.

52 PROJECTS USING IC741
D0386B *$3.95*
Projects include remote thermometer, servodriver, rev counter for petrol and diesel engines, voltage amplifier and a record amplifier with bass boost.

99 PRACTICAL ELECTRONIC PROJECTS
D0392P *$9.95*
Includes audio, automotive, musical instrumentation, photography, remote control and power supply projects.

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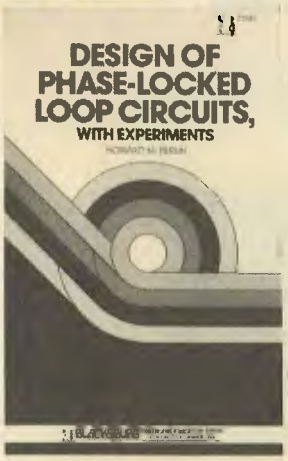

circuit techniques and design

DESIGN OF TRANSISTOR CIRCUITS, WITH EXPERIMENTS
E0051P **$22.75**
A self-teaching course in transistor circuits — seven chapters explore the fundamentals of active semi-conductors and their operating principles and procedures. Experiments in design and semiconductor testing provide hands-on experience.

50 PROJECTS USING RELAYS, SCRs AND TRIACS
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Practical working circuits using silicon controlled rectifiers, relays and bi-directional triodes. With a minimum of difficulty you can use them in motor control, dimming and heating control, timing and light sensitive circuits, warning devices and many others.

50 FET PROJECTS
E0069B **$5.95**
Projects include amplifiers and converters, test equipment, tuners, receivers and receiver aids, mixers and tone controls, etc, etc. The FET used is not critical. This book is of interest and value to SW listeners, radio amateurs, hi-fi enthusiasts and general experimenters.

ETI CIRCUITS — BOOK 1
E0070E **$2.95**
Many of these circuits have been published in the 'Ideas for Experimenters' Section of ETI.

ETI CIRCUITS — BOOK 2
E0071E **$2.95**
See Book 1.

ETI CIRCUITS — BOOK 3
E0072E **$2.95**
See Book 1.

ETI CIRCUITS — BOOK 4
E0073E **$2.95**
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DESIGN OF PHASE-LOCKED LOOP CIRCUITS, WITH EXPERIMENTS
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An easy to understand, illustration-filled guide to designing and constructing transformers. Reviews the fundamentals of electricity, magnetism and algebra needed to understand transformer theory, and covers general design

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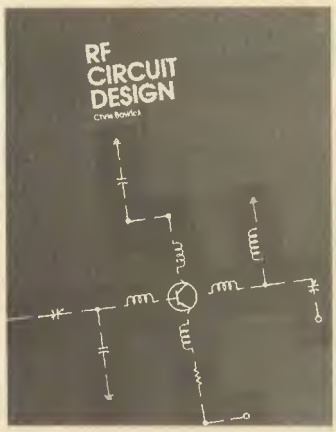

considerations, transformer types, power losses and transformer use in converters and inverters.

ETI CIRCUIT TECHNIQUES — VOL 1
E0076E **$4.95**
The how, what, which, where, why and how much anthology of components, circuits and techniques. Second printing.

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See Volume 1.

ETI CIRCUIT TECHNIQUES — VOL 3
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E0079P **$36.95**
A practical approach to the design of RF amplifiers, impedance-matching networks and filters. Uses a minimum of complex maths.

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Projects include multivibrators, amplifiers and oscillators, trigger devices and other special devices.

SECOND BOOK OF CMOS IC PROJECTS
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Leading on from *50 CMOS IC Projects*, this second book provides a further selection of useful circuits of a simple nature. Contents have been selected to ensure minimum overlap between the two books.

COUNTER DRIVER AND NUMERAL DISPLAY PROJECTS
E0082B **$5.95**
Author F.G. Rayer features applications and projects using various types of numerical displays, popular counter and driver ICs, etc.

TTL COOKBOOK
E0083P **$18.50**
A complete look at TTL logic circuits — what TTL is, how it works, and how to use it. Many kinds of practical TTL are included, such as digital counters, electronic stopwatches, digital voltmeters, etc.

ACTIVE-FILTER COOKBOOK
E0084P **$24.25**
Learn to construct filters of all kinds — highpass, lowpass, bandpass. The book is easy to understand — no advanced maths or obscure theory is used.

UNDERSTANDING IC OPERATIONAL AMPLIFIERS
E0085P **$12.25**
Latest edition of this book covers theoretical and practical aspects of operational amplifiers and associated circuits. Includes material on BiFET and BiMOS and CMOS op-amps.

CMOS COOKBOOK
E0086P **$21.00**
This book explains CMOS technology and its application to 'real world' circuitry. A mini-

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catalogue is included, which lists more than 100 devices, giving pinouts and application notes.

IC TIMER COOKBOOK
E0087P **$26.95**
Gives you a look at the hundreds of ways IC timers are used in electronic instrumentation.

IC OP-AMP COOKBOOK
E0088P **$25.75**
Basic op-amp theory in detail, with 200 practical, illustrated circuit applications: JFET and MOSFET units are featured, plus manufacturers' data sheets and company addresses.

DESIGN OF OP-AMP CIRCUITS, WITH EXPERIMENTS
E0089P **$17.50**
The design of the fundamental circuits that are the basic building blocks of more sophisticated systems. A series of 35 experiments illustrates the design and operation of linear amps, differentiators and integrators, voltage and current converters, active filters, and lots more.

555 TIMER APPLICATIONS SOURCE BOOK, WITH EXPERIMENTS
E0090P **$11.25**
The construction of the 555 timer and numerous practical examples of its applications in all areas of electrical and computer engineering, including 17 simple experiments.

ELECTRIC CIRCUITS AND NETWORKS
E0091P **$18.75**
Comprehensive explanation of the theory, with numerous examples and solved illustrative problems.

HOW TO USE OP-AMPS
E0092B **$7.75**
Design notes and applications on many topics including basic theory, amplifiers, power supplies, audio circuits, oscillators, filters, computers and control engineering. It's written around the 741 IC but includes design notes for most of the common op-amps.

PRACTICAL SOLID-STATE CIRCUIT DESIGN
E0094P **$14.95**
An introductory course in practical solid-state circuit design for the experimenter, designer or technician who is interested in constructing tailor-made circuits.

SCRs AND RELATED THYRISTOR DEVICES
E0095P **$21.25**
Written for experimenters, technicians and engineers, this book is a practical and comprehensive guide to the theory, operation, specifications and applications of silicon-controlled rectifiers (SCRs) and related thyristor devices.

REGULATED POWER SUPPLIES
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Comprehensive discussion of the internal architecture and operation of the latest solid-state regulators. Explains when regulated supplies are needed and how to incorporate

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them in your projects, and discusses modern circuitry including linear and switching circuits and late ICs.

ANALOG INSTRUMENTATION FUNDAMENTALS
E0097P **$29.75**
Numerous practical, hands-on lab experiments and solved problems are included, plus discussions of movements, dc ammeters, voltmeters, ohmmeters, bridges, filters and attenuators. No calculus is required.

SOLAR CELLS
E0098P **$37.95**
In-depth description of the basic operating principles and design of solar cells. It also covers the techniques used to produce solar cells and reviews applications.

ELECTRONIC DESIGN WITH OFF-THE-SHELF ICs
E0099P **$14.70**
It contains virtually all the information you need to design and build electronic circuits, systems and subsystems with readily available ICs.

MODERN FILTER DESIGN
E0100P **$49.95**
This book details the advances in active RC filters, both from a practical standpoint and from a state-of-the-art point of view. Gives detailed analysis and design procedures for switched capacitor filters.

50 PROJECTS USING CA3130 ICs
E0101B **$4.50**
The CA3130 is an advanced operational amplifier capable of higher performance than many others: circuits often need ancillary components. Audio projects, RF projects, test equipment, household projects.

PRACTICAL INTRO TO DIGITAL ICs
E0102B **$5.95**
Introduction to digital ICs (mainly TTL 7400). Besides simple projects, includes logic test set to identify and test digital ICs. Also includes digital counter-timer.

50 CIRCUITS USING GERMANIUM, SILICON AND ZENER DIODES
E0103B **$5.95**
Fifty interesting and useful circuits and applications using the germanium and silicon signal diodes, silicon rectifier diodes and zener diodes, etc.

DESIGN OF VMOS CIRCUITS, WITH EXPERIMENTS
E0104P **$17.75**
The authors look at the technology which makes dramatic advancements possible with VMOS, and show how these components can easily be integrated into common circuit designs to enhance their responses.

UNDERSTANDING CMOS INTEGRATED CIRCUITS
E0105P **$9.95**
This book tells you what CMOS ICs are, how they work, and how they can be used in electronic circuit designs. Practical circuits, with parts values, are included.

E0139P

GUIDE TO CMOS BASICS, CIRCUITS, AND EXPERIMENTS
E0107P **$14.95**
If you are already familiar with TTL devices and are ready to examine the benefits of CMOS, this book is your complete source. It tells you what CMOS devices are, their characteristics and design rules. Experiments demonstrate the concepts discussed.

50 SIMPLE LED CIRCUITS — BOOK 1
E0108B **$4.50**
Fifty interesting circuits and applications using the LED. Includes circuits for the 707 common anode display for the beginner and advanced enthusiast.

IC 555 PROJECTS
E0109B **$6.75**
One wonders how life went on before the 555! Included are basic and general circuits, car and railway circuits, alarms and noise makers plus section on subsequent 556, 558 and 559s.

LM 3900 IC PROJECTS
E0110B **$4.75**
Unlike conventional op-amps, the LM 3900 can be used for all the usual applications as well as many new ones. It's one of the most versatile, freely obtainable and inexpensive devices around. This book provides the groundwork for simple and advanced uses — it's much more than a collection of projects. Recommended.

50 CIRCUITS USING 7400 SERIES ICs
E0111B **$5.95**
Fifty interesting and useful circuits and applications using these versatile devices.

VMOS PROJECTS
E0112B **$6.75**
Though primarily concerned with VMOS power FETs and their applications, power MOSFETs are dealt with, too, in a chapter on audio circuits. Projects include audio circuits, sound generator circuits and signal circuits.

IC CONVERTER COOKBOOK
E0139P **$22.75**
Written for the practising engineer, technician, hobbyist or student, this book will be an invaluable working guide to the understanding and use of IC analogue/digital and digital/analogue converters.

HOW TO DESIGN AND MAKE YOUR OWN PCBs
E0284B **$6.95**
Covers the practical aspects of printed-circuit board design and construction.

ELECTRONIC CIRCUITS
E0288P **$15.95**
Includes fundamentals of transistor theory, bias circuits, equivalent circuits, transistor data sheets, gain considerations in amplifiers, frequency characteristics of amplifiers, multistage and feedback amplifiers and FETs, with many examples and illustrations.

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MODERN CONTROL THEORY
E0289P **$15.95**
Includes fundamentals of matrix algebra, vectors and linear vector spaces, transformations, eigenvalues and eigenvectors, nonlinear equations and perturbation theory, with many examples and solved problems.

DIGITAL ELECTRONICS
E0292P **$15.95**
Includes device theory, basic passive logic and basic active logic, advanced active logic gates, flip-flops and monostables and astables with many examples and illustrations.

ED NOLL'S SOLID-STATE CIRCUIT FILES (TWO VOLUMES)
E0315P **$23.95**
Volume 1 of this two-volume set covers bipolar transistor, FET and linear IC circuits. Volume 2 covers TTL and CMOS circuits. Together, they provide a ready-made set of experiments for circuit study ($23.95 for both volumes).

LEARNING TO WORK WITH INTEGRATED CIRCUITS
E0318R **$2.35**
Discover the basics of integrated circuits while building a simple and useful electronics project. A complete collection of the popular American *QST* series.

UNDERSTANDING DIGITAL LOGIC CIRCUITS
E0321P **$28.35**
Written for the working technician, with many illustrations, this book explains logic principles, digital ICs, adders, counters, encoders, interfacing, TTL and CMOS devices, and much more.

50 SIMPLE LED CIRCUITS — BOOK 2
E0346B **$4.95**
Fifty useful circuits and applications using the LED to complement Book 1 (ETI Book Sales No. E0108B). Includes diode tester, unijunction LED flasher, car voltage probe, SCR tester, fuse tester and simple timer.

DIGITAL LOGIC CIRCUITS — TESTS AND ANALYSIS
E0374P **$25.95**
This working handbook covers the theory of digital logic circuits, starting with simple gates, illustrations of IC pinouts and an introduction to truth tables. Includes tests and analysis.

test equipment and fault-finding

HOW TO GET YOUR ELECTRONIC PROJECTS WORKING
F0114B **$6.95**
Helps you to overcome the problems of a circuit that doesn't work by indicating how and where to start looking for many of the common faults that can occur when building up a project.

F0116B

WALL CHART — TRANSISTOR RADIO FAULT-FINDING
F0115B *$2.95*
Used properly, this chart should enable the reader to trace most common faults quickly. Across the top of the chart are four rectangles containing brief descriptions of the faults. Selecting the appropriate fault, the reader simply follows the arrows and carries out the suggested checks until the fault is cleared.

PRACTICAL REPAIR AND RENOVATION OF COLOUR TELEVISIONS
F0116B *$6.55*
This book shows how to obtain a working colour television for very little outlay by repairing and renovating a set that has been 'written off' by a dealer. Includes practical details of how to construct your own CRT tester/rejuvenator and cross-hatch generator.

USE OF THE OSCILLOSCOPE
F0117P *$27.95*
Programmed instruction course for use in a basic electrical engineering laboratory course. Author assumes basic knowledge of DC and AC circuits but none of oscilloscopes.

TEST GEAR — METERING AND POWER-SUPPLY PROJECTS
F0118E *$3.00*
Includes many types of meters, audio noise and signal generators, CMOS tester, oscilloscope calibrator, etc.

TEST GEAR — VOL 2
F0119E *$3.95*
Projects include audio oscillator, transistor tester, true RMS voltmeter, RF signal generator, versatile logic test probe, microwave oven leak detector, etc.

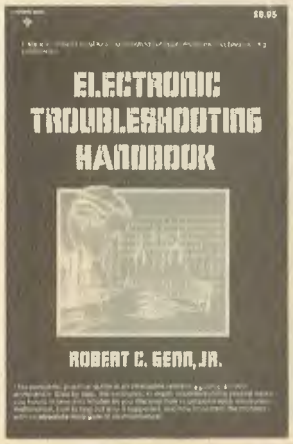
TEST GEAR — VOL 3
F0255E *$4.95*
Projects include RF attenuator, op-amp tester, tacho calibrator, transistor tester, mains cable seeker, electric fence tester, portable core-balance relay, etc.

AUTOMOTIVE TUNE-UP AND EMISSION-CONTROL SERVICE
F0120P *$22.75*
Car owners who wish to save money and maintain their cars at peak performance will learn how to adjust, repair and maintain the systems that ensure best operation.

TROUBLESHOOTING WITH THE OSCILLOSCOPE
F0121P *$16.95*
Excellent for the professional service technician or the serious hobbyist, as it combines step-by-step procedures for using the scope with the specific nuts and bolts of television receiver troubleshooting.

ELECTRONIC TEST EQUIPMENT CONSTRUCTION
F0122B *$5.95*
Describes construction wide range of test gear, including FET amplified voltmeter, resistance bridge, field strength indicator, heterodyne frequency meter, etc.

F0257P



ELECTRONIC TROUBLESHOOTING HANDBOOK
F0257P *$10.50*
This workbench guide shows you how to pinpoint transistor troubles in minutes, how to test almost everything electronic and how to get the most out of low-cost test equipment.

EFFECTIVELY USING THE OSCILLOSCOPE
F0258P *$16.95*
Describes the potential uses of the scope, ranging from audio and television tests and measurements to performance tests.

USE OF THE DUAL-TRACE OSCILLOSCOPE
F0259P *$23.75*
This programmed text breaks down the process of operating a scope into a series of logical steps, starting with the deflection of the electron beam and continuing through proper use of the triggering controls to measure the phase difference between two waveforms.

HOW TO BUILD YOUR OWN SOLID-STATE OSCILLOSCOPE
F0282B *$6.95*
This book comprises a project divided into sections for builder to individually construct and test — then assemble into complete instrument. Includes short section on scope usage.

electronic music and audio/video

MOBILE DISCOTHEQUE HANDBOOK
G0093B *$4.95*
Most people who start mobile discos know little about equipment or what to buy. This book assumes no preliminary knowledge and gives enough info to enable you to have a reasonable understanding of disco gear.

CHEAP VIDEO COOKBOOK
G0123P *$11.75*
Complete discussion of a new, low-cost way to get words, pictures and opcode out of your computer and onto any ordinary television screen, using a seven-IC easy-to-build circuit which you can build for $20.

AN INTRODUCTION TO VIDEO
G0124B *$6.95*
This book is written in layman's language and is for anyone who is thinking about buying or renting or who has just bought or rented a video recorder and wants to get the best out of the machine.

AUDIO CYCLOPEDIA
G0125P *$71.95*
A complete in-depth look at the art of audio — from the basic principles of sound to solid-state and integrated circuits. More than 3000 entries and hundreds of illustrations and circuit diagrams cover acoustics, amplifiers, recording, reproduction, test equipment, audio measurements, and much more.

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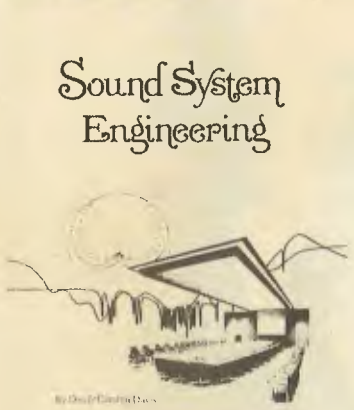

ELECTRONIC MUSIC CIRCUITS
G0126P *$26.95*
How to build a custom electronic music synthesiser, outlines numerous other circuit designs and then shows you how to modify them to achieve particular responses. Many of the circuits can be used as special-effects boxes for guitars and other musical instruments.

INTRODUCTION TO ELECTRO-ACOUSTIC MUSIC
G0127P *$15.95*
This book assumes no previous technical knowledge. It discusses the relationship between the technology and the composition of electro-acoustic music.

MODERN RECORDING TECHNIQUES
G0128P *$21.95*
Explains the equipment controls and techniques found in a modern recording studio and how to use them creatively and correctly to produce a desired result. Numerous photographs, diagrams and charts.

SOUND-SYSTEM ENGINEERING
G0129P *$35.50*
Dealing with audio systems as a whole, it includes installing and equalising the sound system and interfacing the electrical and acoustic systems. Instrumentation, the acoustic environment and designing for acoustic gain.

TUBE SUBSTITUTION HANDBOOK
G0130P *$8.75*
Complete, accurate, up-to-date guide to direct substitutes for receiving and picture tubes. Contains more than 6000 receiving tube substitutes, 4000 monochrome and colour picture tube substitutes, and 600 communications substitutes. Also includes pinouts for quick operational checks.

HOW TO BUILD SPEAKER ENCLOSURES
G0131P *$8.75*
A guide to the 'whys' and 'hows' of constructing top-performance loudspeaker enclosures.

VIDEO TAPE RECORDERS
G0132P *$21.25*
In this completely revised second edition, the author tells in simple language how helical VTRs work and how to operate and service them. Includes numerous examples of circuits and mechanical systems.

ELECTRONIC SYNTHESISER PROJECTS
G0133B *$5.95*
For the electronic music enthusiast, an invaluable reference. This book is full of circuits and information on how to build analogue delay lines, sequencers, VCOs, envelope shapers, etc, etc. The author takes a clear and logical approach to the subject that should enable the

G0345P

average enthusiast to understand and build up what appears to be a quite complex instrument.

AUDIO PROJECTS
G0134B *$6.95*
Covers a wide range of audio projects, including preamplifiers and mixers, power amplifiers, tone controls and matching, etc. Board layouts and wiring diagrams included.

ELECTRONIC MUSIC PROJECTS
G0135B *$5.95*
Provides constructors with practical circuits for the less complex music equipment including fuzz box, waa-waa pedal, sustain unit, reverb and phaser, tremolo generator, etc. Text covers guitar effects, general effects, sound generators, accessories.

ELECTRONIC MUSIC AND CREATIVE TAPE-RECORDING
G0136B *$6.95*
Shows how electronic music can be made at home with the simplest and most inexpensive of equipment. Describes how the sounds are generated and how these may be recorded to build up the final composition.

PRACTICAL CONSTRUCTION OF PREAMPS, TONE CONTROLS, FILTERS, ATTENUATORS
G0137B *$5.25*
This book shows the enthusiast how to construct a variety of magnetic tape recording, microphone and disc preamplifiers, and also a number of tone control circuits, rumble and scratch filters, attenuators and pads.

AUDIO IC OP-AMP APPLICATIONS
G0138P *$15.25*
This book discusses IC op-amps and their application in audio systems, and describes the numerous advantages of using op-amps, including low power consumption, reliable performance and low cost. Assumes a basic understanding of op-amp theory.

AUDIO PROJECTS FROM ETI
G0260E *$5.00*
Projects include Series 4000 moving-coil cartridge preamplifier, general-purpose 150 W MOSFET power amp module, versatile public-address amplifier, etc, etc.

30 AUDIO PROJECTS
G0274E *$3.95*
Projects include 25 W amp, general-purpose preamp, bucket brigade delay line, active crossover, tape noise limiter, etc, etc.

THE COMPLETE GUIDE TO HIGH FIDELITY
G0305P *$23.75*
Includes explanations of digital recording, amplifiers, tuners, drive motors, preamplifiers, proximity effect and impedance matching. Thirty basic systems, for limited to unlimited budgets, are also discussed.

SON OF CHEAP VIDEO
G0345P *$15.95*
Don Lancaster's sequel to *The Cheap Video Cookbook* (ETI Book Sales No. G0123P) includes new and improved circuits to get

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alphanumeric and graphics video out of a microcomputer and on to an ordinary television.

TAPE RECORDER SERVICING GUIDE
G0361P *$8.75*
An invaluable reference manual for technicians engaged in repairing tape recorders. Limited supplies.

SINGLE-CAMERA VIDEO PRODUCTION
G0379P *$25.75*
Step-by-step diagrams and illustrations show you how to produce low-budget, high-quality video programs. Chapters on audio, lighting, shooting, editing, graphics and set design.

PRACTICAL TRANSISTORISED NOVELTIES FOR HI-FI ENTHUSIASTS
G0382B *$2.95*
Includes quadrophony, stereo headphone adaptor, phasing stereo loudspeaker systems, high impedance four-channel mixer and speaker gain control. Limited supplies.

AUDIO ENTHUSIAST'S HANDBOOK
G0383B *$2.75*
Includes the record/playback curve, stylus compliance, acoustic feedback, stereo tape track standards, compensating sideways drag and amplifier power ratings.

CHOOSING AND USING YOUR HI-FI
G0385B *$4.95*
Provides basic information on the technical specifications of hi-fi equipment. Offers advice on what to look for in equipment in order to obtain real high-fidelity sound and reproduction.

computers for beginners

COBOL FOR BEGINNERS
H0140P *$27.95*
It is a solid text for introductory programming courses in Cobol, using a format that is easy to understand, yet comprehensive enough to make supplementary readings unnecessary.

THE PET PERSONAL COMPUTER FOR BEGINNERS
H0141P *$20.95*
This handy guide is written for use with all varieties of PET computer, from the original 2001 to the 8032 Super PET. It is suited to novices with no practical experience and provides advice and practical examples.

BIG THINGS FROM LITTLE COMPUTERS
H0142P *$19.25*
A layperson's guide to personal computing with all the basic information and lots of examples of how personal computers can be used.

BEGINNER'S GUIDE TO MICROPROCESSORS AND COMPUTING
H0143B *$6.95*
Introduction to basic theory and concepts of

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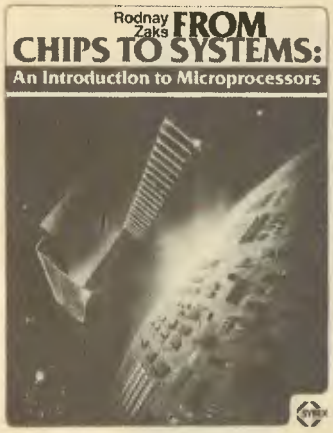

binary arithmetic, microprocessor operation and machine language programming. Only prior knowledge assumed is very basic arithmetic and an understanding of indices.

A MICROPROCESSOR PRIMER
H0144B *$5.95*
Learning about microprocessors is easy with this book, written in a style that is easy to follow. The shortcomings of this basic machine are discussed and the reader is shown how these are overcome by changes to the instruction set. Relative addressing, index registers follow as logical progressions.

AN INTRODUCTION TO BASIC PROGRAMMING TECHNIQUES
H0145B *$6.75*
Ideal for beginners seeking to understand and program in BASIC. Includes program library for biorhythms, graphing Y against X, standard deviations, regressions, generating musical note sequences, and a card game.

BEGINNING BASIC
H0146A *$22.35*
Intended for beginners with no computing experience, one should be able to intelligently program in BASIC in a short time.

BEGINNING FORTRAN
H0147A *$25.50*
Starts with simple elementary examples and proceeds to intermediate level programs. Also includes references, tutorials, flow charts, deck set-ups and matrix algebra.

UNDERSTANDING COMPUTERS
H0148A *$20.95*
For people who use small computers, this book starts with the most elementary gates and works up to the complete computer. Gives an understanding of the languages and how they operate in the computer.

NAILING JELLY TO A TREE
H0149A *$25.50*
This guide to software teaches you about machine language, assembly language programming and BASIC. The emphasis is not on learning to write programs but on learning to use the thousands of available programs that have already been written.

PEANUT BUTTER AND JELLY GUIDE TO COMPUTERS
H0150A *$16.75*
A simple, easy-to-digest source of information on personal computing for the potential buyer who is less than an expert in the field.

INTRODUCTION TO WORD-PROCESSING
H0151A *$17.95*
Written for the non-technical reader, this book tells about the concepts common to all word-processing systems, then analyses all features.

FROM CHIPS TO SYSTEMS: AN INTRODUCTION TO MICROPROCESSORS
H0152A *$25.75*
Explains exactly what a microcomputer system is and how it works. Introduces fundamental

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concepts and covers all aspects of microprocessors and related components: internal operation, memories, interfacing and system development, etc.

DON'T (OR, HOW TO CARE FOR YOUR COMPUTER)
H0153A **$19.95**
A guide to computer and peripheral preservation. Specific advice for the computer, floppy disks, hard disks, the CRT terminal, the printer, tape units, the computer room, software and documentation.

COMPUTERS FOR EVERYBODY
H0270A **$8.95**
In this easy-to-understand book it is explained how a computer can be used at home, in the office or at school. Includes a consumer's guide to computer equipment that will help the reader decide what to buy and who to buy it from. Second edition.

YOUR FIRST COMPUTER
H0271A **$15.25**
An easy-to-understand beginner's book to small computers. Understanding them, buying them and using them for personal and business applications.

MICROCOMPUTERS: A PARENTS' GUIDE
H0275J **$13.75**
In clear, non-technical language, the authors explain what micros are, what they can do and what to expect in the future.

HART'S DICTIONARY OF BASIC
H0276J **$15.75**
Contains more than 800 entries which summarise the actions of almost every statement, command or function you are ever likely to meet. Each entry is explained in plain English, not computerese.

KIDS AND THE APPLE
H0300P **$25.75**
How to write programs for the Apple computer, including action games, board games and word games.

ATARI PILOT FOR BEGINNERS
H0308P **$21.95**
Shows how to make the Atari 400 and 800 home computers play music, display colourful moving pictures and do mathematics. Shows how to use the Pilot computer language.

FOUNDATIONS OF COMPUTER TECHNOLOGY
H0312P **$29.95**
A thorough introduction to computer technology for business people, engineers, professionals, students and hobbyists. Assumes no prior knowledge of computers, electronics or mathematics.

MODERN COMPUTER CONCEPTS
H0313P **$29.95**
The second volume in this series (following ETI Book Sales No. H0312P) covers subjects such as semiconductor memory devices, central processor units, magnetic memories, datacommunications, computer networks and videotex.

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THE APPLE PERSONAL COMPUTER FOR BEGINNERS
H0344P **$17.75**
Comprehensive introduction to the Apple II and Apple II Plus computers written for beginners. Provides step-by-step illustrations with sample programs and responses, concentrating on Applesoft BASIC, with an appendix on Integer BASIC. Includes chapters devoted to disk systems, graphics, colour and music.

THE ILLUSTRATED WORD-PROCESSING DICTIONARY
H0387P **$15.95**
Includes 54 different word-processing functions described and illustrated, descriptions of equipment types, software and magnetic media, word-processing terminology and exercises.

computer hardware and techniques

COMPUTERS AND COMPUTING YEARBOOK '83
J0014E **$4.95**
Includes ZX81, Epson MX80 printer, System 80 joystick project, 660 software, ZX80 programs, etc, etc.

THE 6809 COMPANION
J0154B **$6.95**
This is not a beginner's introduction to microprocessors in general but a discussion of the features of the 6809 and a reference.

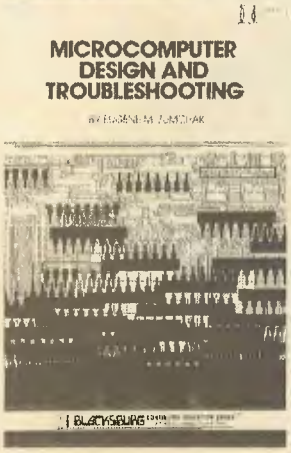
COMPUTERS AND COMPUTING YEARBOOK '82
J0155E **$4.95**
Includes disks, CP/M and your computer, learners microcomputer, programming in CHIP-8, alphasort, fast plotter, PET talk, System 80.

Z80 MICROCOMPUTER DESIGN PROJECTS
J0156P **$20.75**
A complete look at the internal architecture of the Z80, the heart of many microcomputers, and even shows how to build a microcomputer, the EX80, using this powerful chip.

MICROPROCESSOR CIRCUITS
J0157P **$14.75**
Presents basic microprocessor concepts in simple language for beginners and teaches you to construct a useful microcontroller system. Offers 30 demo circuits which take you through assembly, operation and programming of a microcontroller.

INTERFACE PROJECTS FOR THE APPLE II
J0158P **$15.95**
A series of interface projects that are easily built and enable the user to realise the computer's potential through project construction. Projects are primarily hardware-orientated, with some software supporting the hardware.

J0161P



DON LANCASTER'S MICRO COOKBOOK
J0159P **$20.75**
This 'cookbook' starts with the very fundamentals of microprocessors and microcomputers and takes you through number systems, codes, etc, till you can work intelligently with micros.

THE S100 AND OTHER MICRO BUSES
J0160P **$13.25**
The key to successful computer expansion is a complete understanding of the bus system, through which the computer communicates with peripherals. This book will give you that understanding.

MICROCOMPUTER DESIGN AND TROUBLESHOOTING
J0161P **$26.75**
Tells you how to design microcomputer systems and make them work without an expensive commercial development system or the need for costly test instrumentation. Includes a complete description of two microprocessors — the 8085 and the 6502.

IAPX 88 BOOK
J0162P **$20.25**
This book from Intel itself describes the unique Intel 8088 microprocessor in total detail. invaluable for all involved with the 8088.

USING THE 6800 MICROPROCESSOR
J0163P **$13.25**
Guides the reader through the conception, configuration, writing and running of a variety of programs that demonstrate practical use of a 6800 system.

STD BUS INTERFACING
J0164P **$21.75**
Explains what the STD bus is, in easy-to-understand language.

A STEP-BY-STEP INTRODUCTION TO 8080 MICROPROCESSOR SYSTEMS
J0165A **$16.95**
Doesn't require any electronics or computer background. This book describes the 8080 architecture and instruction set through simple examples. Some basic software is introduced.

MICROPROCESSOR INTERFACING TECHNIQUES
J0167A **$29.95**
Teaches you how to interconnect a complete microprocessor system and interface it to the usual peripherals. The hardware and software skills needed to effectively interface peripheral devices are covered along with various buss standards and A/D conversion. Third edition.

EXPERIMENTS IN ARTIFICIAL INTELLIGENCE FOR SMALL COMPUTERS
J0168P **$13.25**
Artificial intelligence is the capability of a device to perform functions normally associated with human intelligence. With this book, a small computer with extended BASIC and some knowledge of BASIC language, you can conduct experiments in artificial intelligence.

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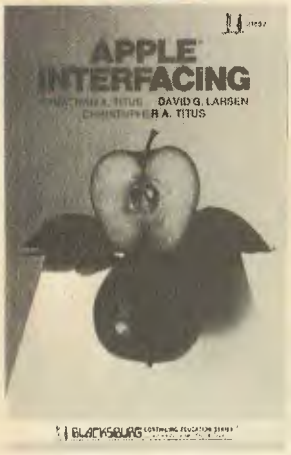

PET INTERFACING
J0169P *$25.25*
Demonstrates how to build numerous interfacing devices for PET hardware. BASIC language programs are used throughout, and the book includes a discussion of the microprocessor's internal architecture and general hardware/software interfacing.

6809 MICROCOMPUTER PROGRAMMING AND INTERFACING, WITH EXPERIMENTS
J0170P *$21.95*
Gives a solid understanding of how to program and interface the high-performance 6809 microprocessor. The author completely explores internal structure, addressing modes, data movement instructions, registers, arithmetic logic and test instructions for the 6809.

Z80 MICROCOMPUTER HANDBOOK
J0171P *$17.50*
This handbook covers hardware, software and microcomputers built around the Z80.

PRACTICAL COMPUTER EXPERIMENTS
J0172B *$5.95*
How to build typical computer circuits using discrete logic. Useful intro to devices such as adders and storers as well as a general source book of logic circuits.

INTERFACE PROJECTS FOR THE TRS-80 (MODEL III)
J0203P *$19.25*
This practical manual describes how TRS-80 Model III users can better utilise their micros. Written for the TRS-80 user with some computer experience, it provides a series of easily built interface projects that enable the user to discover the computer's capabilities as each project is constructed.

APPLE INTERFACING
J0273P *$15.95*
Using this book, you will be able to perform useful experiments which will provide a much clearer understanding of the fundamentals of computer interfacing and computer electronics.

THE SINCLAIR SPECTRUM IN FOCUS
J0277J *$16.45*
The reader is taken on a programming course in ZX Spectrum BASIC which progresses toward some of the most advanced techniques that may be used on the ZX Spectrum. Numerous examples and more than 50 programs are included.

PC DOS: USING THE IBM-PC OPERATING SYSTEM
J0278J *$22.95*
This self-paced guide teaches you how to become an accomplished user of all the major disk-operating system functions and utilities, no matter how much or how little computer experience you have.

A Z80 WORKSHOP MANUAL
J0283B *$8.95*
Intended for those who want to progress beyond BASIC programming to topics such as machine-code and assembly language programming or who need hardware details of the Z80-based computer.

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EASY ADD-ON PROJECTS FOR SPECTRUM, ZX81 AND ACE
J0285B *$7.75*
The projects include a pulse detector, picture digitiser, five-key pad, model controller, bleeper, lamp flasher, light pen, etc, etc.

MICROSOFT FORTRAN
J0291A *$24.95*
Various techniques involved in MicroSoft programming are explained, including structural programming and top down programming. Compiler, editor and linker are discussed, along with the various uses of the printer, disk and video terminal.

TV TYPEWRITER COOKBOOK
J0297P *$14.50*
A complete guide to low-cost television display of alphanumeric and graphics data for microprocessor systems, computer hobbyists, television titling, word-processing and video games.

8080A MICROCOMPUTER INTERFACING AND PROGRAMMING
J0302P *$23.25*
Second edition of this valuable reference book introduces you to the 8080, probably the most widely-used microprocessor chip. Teaches the fundamental tasks of microcomputer interfacing, discusses polled operation and interrupt operation, and much more.

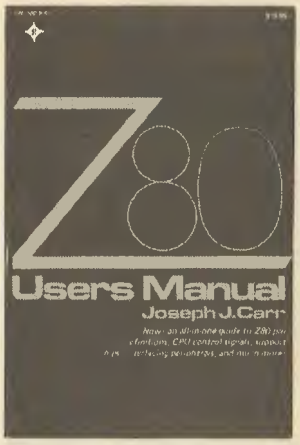
HOW TO PROGRAM AND INTERFACE THE 6800
J0303P *$20.75*
An in-depth introduction to microprocessors and microcomputers in general and the Motorola 6800 microprocessor family in particular. Includes experiments for the Heath ET3400 and Motorola MEK6800D2 learning systems designed to demonstrate 'real world' applications. Limited supplies.

8085A COOKBOOK
J0304P *$21.75*
Beginning with basic concepts, shows how to design a microcomputer using the 8085A microprocessor chip. Includes discussions of system control, memory systems, interfacing and 8085A-family-compatible chips.

TRS-80 INTERFACING — BOOK 1
J0306P *$14.75*
An introduction to the internally generated signals available to the TRS-80. It also shows how to use them under BASIC language program control and control external devices. Assumes a good understanding in Level II BASIC.

TRS-80 INTERFACING — BOOK 2
J0307P *$15.75*
Advanced interfacing techniques for the TRS-80. Shows how the computer can be used to drive high-current and high-voltage loads, generate voltage and current signals and more. Includes a chapter on serial communication and remote control.

J0331P



USING THE IBM PERSONAL COMPUTER
J0319P *$21.50*
This all-purpose beginner's book is a complete guide to the IBM-PC.

REAL-TIME CONTROL WITH THE TRS-80
J0325P *$19.25*
How to plan and develop a real-time data-logging or control system and avoid the pitfalls. Includes a detailed case example of the development of a real-time control system,

MICROCOMPUTER INTERFACING WITH THE 8255 PPI CHIP
J0326P *$12.95*
A self-instructional text designed to introduce the Intel 8255 programmable peripheral interface through experiments. Much of the material is applicable to PPIs in general.

USING THE OSBORNE 1 COMPUTER
J0327P *$21.50*
How to get the most out of the Osborne 1 portable computer.

MC68000: 16-BIT MICROPROCESSOR USER'S MANUAL
J0328P *$19.25*
In this third edition, Motorola offers the latest information to design engineers, software architects and computer designers in order to complete software systems using Motorola's MC68000 microprocessors.

Z80 USER'S MANUAL
J0331P *$13.25*
An all-in-one guide to Z80 pin definitions, CPU control signals, support chips, interfacing peripherals, addressing modes and much more.

CAI SOURCEBOOK
J0333P *$19.75*
Explains computer-assisted instruction (CAI) in education and industrial training and how and why to become a CAI author.

MICROCOMPUTER: ANALOG CONVERTER SOFTWARE AND HARDWARE INTERFACING
J0334P *$15.95*
An introduction to the concepts and techniques of interfacing digital computers to analog devices. Applicable to all 8080-type computers, including the 8080A, 8085, Z80, etc.

Z8000 CPU USER'S REFERENCE MANUAL
J0337P *$17.95*
Though written as a manual for Zilog's Z8000 microprocessor, this text is also applicable to the Z8001 and Z8002 microprocessors. Includes overviews of architecture, address spaces, CPU operation and external interfacing.

Z8000 HANDBOOK
J0341P *$18.95*
Provides a complete and clear description of

J0360P

the function and operation of the Z8001 and Z8002 16-bit microprocessors. Includes information on data types, memory management, interfacing and peripheral devices and the Z8000 instruction set.

16-BIT MICROPROCESSORS
J0342P *$20.95*
A guide to the most popular of the 16-bit microprocessors, including the Intel 8086, the Zilog Z8001 and 8002 chips, the DEC LSI-11, Texas Instruments 9900, the Motorola 68000 and the National Semiconductor 16000 family.

WORD-PROCESSING SKILLS AND APPLICATIONS USING WANG SYSTEMS
J0347P *$26.25*
A training book for the Wang CRT word-processor, covering three levels of instruction: Level I BASIC, Level II Advanced and Level III Glossary. Many exercises included.

THE 8080A BUGBOOK: MICROCOMPUTER INTERFACING AND PROGRAMMING
J0349P *$21.75*
Covers the four fundamental tasks of microcomputer interfacing — device pulse generation, microcomputer output, microcomputer input and interrupt servicing — for 8080-based microcomputers.

Z80 MICROPROCESSOR PROGRAMMING AND INTERFACING — BOOK I
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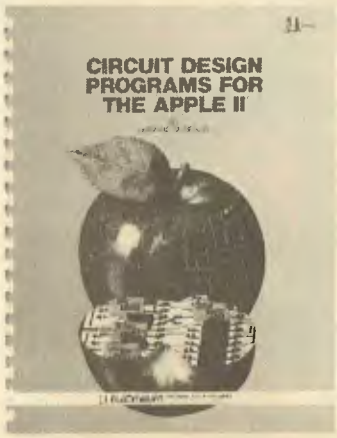

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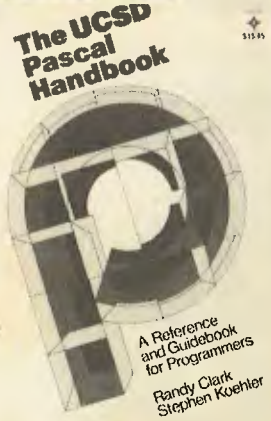

Z80-based microcomputers. Complete terminology, hardware and software concepts, startup of a CP/M/system, and a complete list of CP/M-compatible software.

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THE ART OF PROGRAMMING THE 16K ZX81
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A sequel to *The Art of Programming the 1K ZX81* (ETI Book Sales No K0226B), this book sets out to help you use your 16K RAM pack and ZX printer to the full. It concentrates on good programming style and introduces some interesting programs that are both fun and useful.

APPLESOFT LANGUAGE
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PASCAL PRIMER
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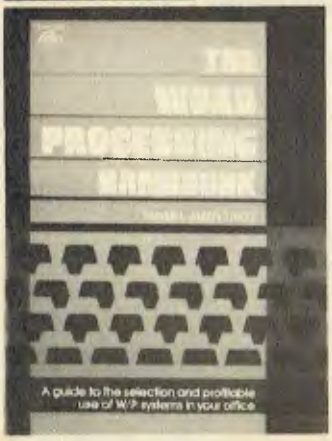

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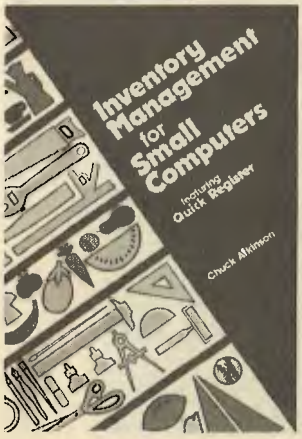

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L0397P *$39.95*
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THE VISICALC BOOK — ATARI EDITION
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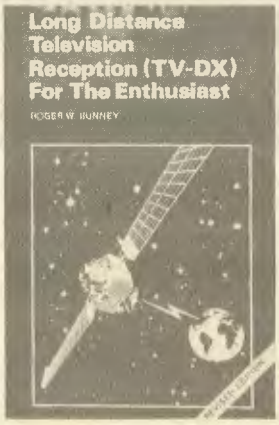

amateur radio, dx communications

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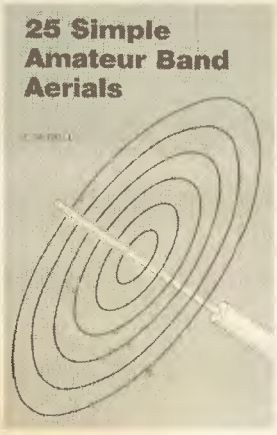

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trol panel using an elastomeric keyboard. The keypad provides a 'cursor control pad' to move the pen left, right, up and down, with a 'fast' key in the centre for high-speed pen movement. Other keys allow the pen to be raised or lowered, moved to upper right or lower left, the plotter to be paused while paper is changed or adjustments made, pen delay set and the plotter self-test executed.

At the left end of the bar is the paper load button, which lifts the pinch wheels off the drive wheels and allows the user to slide a sheet of paper into place. The rear of the printer has a power connector and switch, as well a parallel connector to the host computer.

The Sweet-P is quite ruggedly constructed. It's not a scientific/professional-quality plotter of the kind we're used to finding in laboratories – but let's be honest, a lot of these are too fancy for the job anyway.

The paper – to the host computer – looks like an array of points 2500 by 1838, with each point represented with an accuracy of 0.1 mm (0.004 inch). Thus the drawing area works out to be 25 cm by 18.38 cm (10 by 7.35 inches). However, Sweet-P accepts co-ordinates up to 65535 in either direction, giving an imaginary paper size of over six and a half metres square. Obviously, you are limited to A4 paper in the real world.

The Sweet-P can draw at a maximum speed of 150 mm/s (six inches per second), which is more than adequate for a device in this price range.

Commands

Commands are sent to the plotter as ASCII text strings, so that Sweet-P is easy to drive from virtually any language. Samples are given in BASIC in the manual, but any language which can drive a printer will do (see page 15).

Drive With Lotus

An added advantage of the Sweet-P is that it is one of the standard plotters which can be driven by Lotus 1-2-3. In fact, I tried out the Sweet-P with 1-2-3, using two monitors, and found the whole package a delight to use, giving rise to terminal addiction. Some sample plots are shown on page 15; the most complex of them took about five minutes of experimenting to produce.

The Sweet-P is supplied with a demonstration and utility program called Sweet-Plot 1. This includes menu-driven routines to produce line, bar and pie charts, as well as demonstrations such as drawing the space shuttle and an R2-D2 type 'droid'. Sweet-plot 1 is available for the IBM-PC and the Apple II.

The manual is clear and detailed, and well-written for the first time user. It includes a BASIC demonstration of driving the Sweet-P, which starts with simple plotting of axes and increases in complexity.

In summary, then, the Sweet-P plotter is an inexpensive and very useful device for scientists, engineers, and business professionals who do a lot of number crunching. It will be a sure-fire hit with those people.

The Sweet-P sells at $1499.00 including sales tax from SourceWare Pty Ltd, 4/73 Albert Avenue, Chatswood 2067, whom we thank for loaning us the machine. ❑

VIC 20

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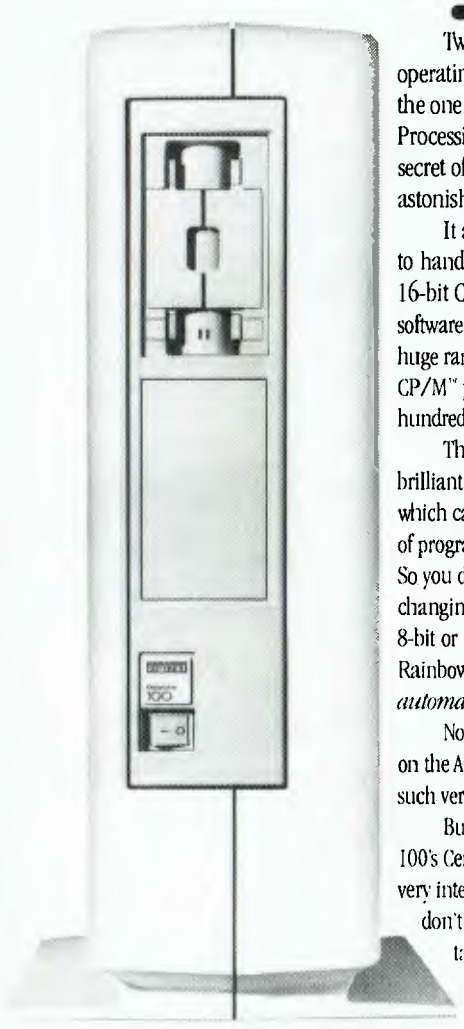

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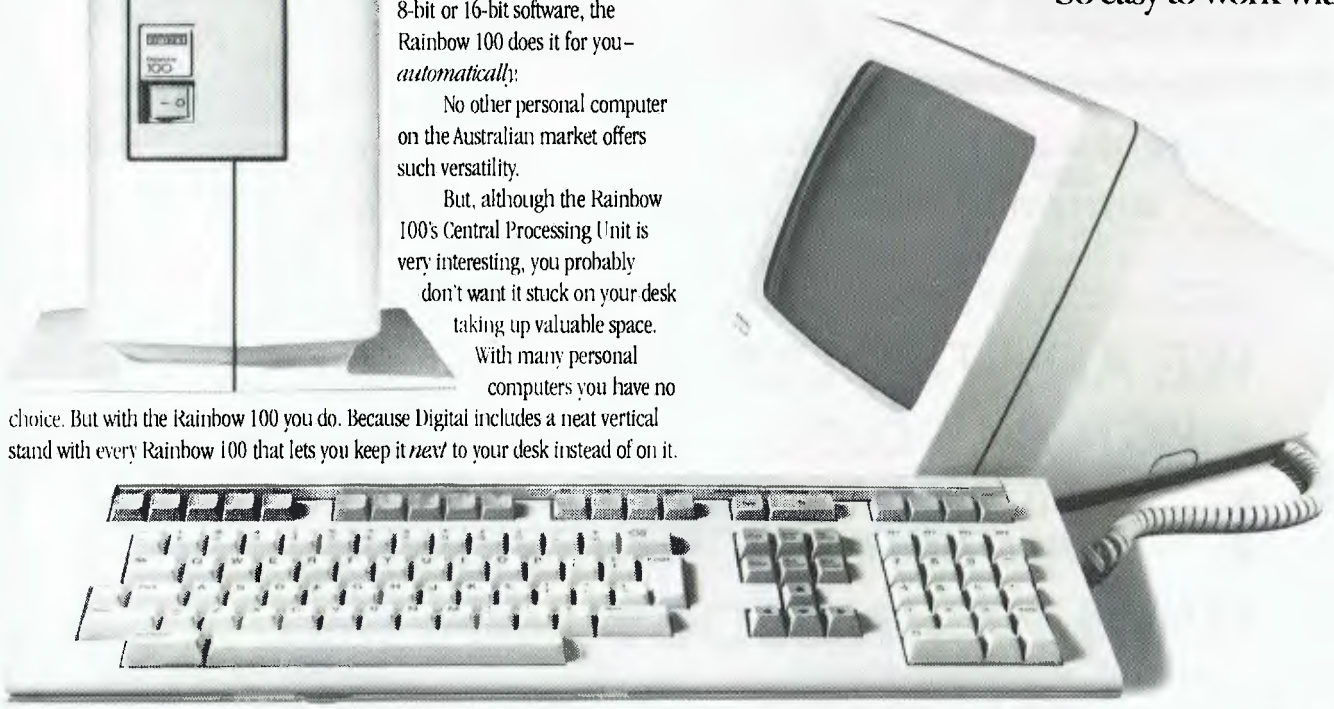

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Knowing that word joining is still the major reason people buy personal computers, Les Bell looks at another word processing program: VisiWord.

Visiword

VisiCalc (remember VisiCalc?) appeared in 1979 from a small company called Personal Software, founded by Harvard MBA graduate Dan Fylstra. VisiCalc was written by a couple of friends of his, who had their own company called Software Arts and did not have the contacts or resources to market the product themselves.

VisiCalc was a sure-fire winner, and so dominated the operations of the fledgling Personal Software that the name of the company was changed to VisiCorp. Then came VisiTrend/Plot, VisiFile, VisiDex and the rest.

The latest addition to the range is VisiWord, a new word processing package for the IBM-PC. Stressing ease of use, the new package is a good choice for first-time users.

VisiWord makes good use of the IBM-PC's large keyboard. As far as possible, the keys do as their labels say – an admirable rule not always followed by other programs. In addition, the ten function keys at the left of the keyboard are used with a template to label their functions.

VisiWord is menu-driven, with an extensive help command, so it is difficult for the user to go wrong once he understands the underlying concepts and a few key phrases. The system is fired up by typing (go on, guess!) – VW – and proceeds to load. I suspect VisiWord is written in some high-level language, probably Pascal, judging by the time it takes to load. VW.COM itself is a 56 Kbyte file, and there are three other overlays totalling 76 Kbytes, plus over 10K of help file. This is no lightweight editor – it needs 192 Kbytes of memory to run.

One breath of fresh air for seasoned campaigners: VW is not copy protected, which means you can run it from a hard disk. At long last, VisiCorp seems to realise that having forked out several hundred dollars, you are not going to [illegible]opies away to all and sundry. In any case, maybe it means that at last we have grown-ups in the game.

Signing On

On powering up, VW signs on with the usual advert for VisiCorp, and instructions to move the cursor over the activity of choice and press return to perform it. Alternatively, the user can press '?' for help. Pressing the initial letter of commands works, too.

The initial options are to create or revise a document. Selecting create clears the screen, after much whirring and clicking, and the main editing screen appears. This has a ruler across the top, indicating tab stops, a border line, and a status line at the bottom with a menu line below that.

The user can now go ahead and start typing text, using the standard editing keys on the IBM-PC keyboard. Editing text on entry is really very simple.

Hitting escape accesses the single-line main menu at the foot of the screen. The user can now select from Delete, Copy, Move, Find, Layout, Windows, Storage, Print, Options, ? = help and Exit.

The Delete Menu offers the user the ability to delete text, a column (typically of figures) or the entire contents of memory. VisiWord is a memory-oriented editor, requiring explicit saving of files.

Copy and Move can both work on marked text or columns. Layout is the most complex menu selection on the system. This choice allows the user to access a sub-menu, and yet another sub-menu, to perform layout tasks.

The Format Sheet (VW/Layout/Format) controls the line spacing, justification, character spacing, lines per page and the initial page number. It appears on the screen as a form, and the user just fills it in.

The Ruler option on the Layout menu allows the user to change tab settings, indents and margins. It moves the ruler line down over the current cursor position (a nice touch) and then offers the user the chance to change the settings. Incidentally, in normal use, the ruler line contains a small triangular cursor which shows the current position of the text cursor; another nice touch. Analogue displays, yet!

Also on the Layout menu are settings for headers and footers, messages (which are comments in the text which display while printing), and the append sheet, which defines boilerplating of text. This makes boilerplating text particularly easy and obvious. ▶

SPECIFICATIONS AND REPORT CARD

Program:	VisiWord
Made by:	VisiCorp
Distributed by:	Imagineering
Useful for:	Word processing and joining
Hardware required:	IBM-PC, 192K, one (at least) disk drive

Ratings:	Excellent	Very Good	Good	Poor
Documentation:	•			
Ease of use:	•			
Speed:		•		
Functionality:	•			
Support:	•			
Value for money:		•		

Options:	VisiSpell
Price:	$388 incl. sales tax ($633 with VisiSpell incl. tax).
Review copy from:	Imagineering, PO Box 4601, Sydney 2001

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The Char choice on the Layout sheet allows character attributes such as emphasised type, underlining, super- and sub-scripting and overstrikes to be controlled. Selecting an emphasised mode immediately sets the character under the cursor to that type, and the Again key (F2) is then used to transfer that attribute to successive characters. Ghost hyphens (alias soft hyphens) are also controlled through this selection.

The Windows option on the main menu allows the user to split the screen into two windows and continue to edit both of them; this is a particularly useful feature for use with the Append Sheet. More than two windows at once is of dubious value as they get smaller and smaller and the user struggles to remember what's what; two seems a sensible choice.

Printing

Printing can be performed while editing or as a single task. In the latter case, the system prints the document directly from memory, saving the creation of a disk file; in the former, a disk file is created and the system prints that. A document can also be printed to disk.

Various print-time parameters can be set up, including page offsets, pauses at end of page to change the paper, and so on. The package can print from the beginning of the document or from the current line. An additional facility on the Layout sheet allows the user to send special strings to the printer to control unique features such as expanded typefaces. These instructions are user-definable without having to do any machine-code patching.

Printers supported include the IBM printer, Epson MXs, Okidata, Qume, Diablo and NEC Spinwriters, which covers all the popular models for word processing applications.

The Storage option on the main menu allows loading and saving of files, inclusion of one file within another, file appending and disk maintenance tasks such as renaming, disk initialisation (formatting) and other jobs.

VisiWord is compatible (obviously) with VisiSpell, so you need never commit literary foxes paws again. It can also be used with VisiFile to create form letters.

The documentation is excellent, organised by function rather than by menu, which is good, as generally you want to know how to do something, and not what the system just did. There are clear diagrams and illustrations, as well as some sample documents illustrating layout techniques.

VisiWord comes with the usual User Support Plan forms and Reader's Critique form for the manual, plus scads of dire warnings about copyright. There's also a Quick Start Course, which is particularly easy to follow, and a reference card.

The whole package is very easy to use. Personally, I like having all the editing functions immediately available through control keys rather than ESCaping to a menu, but that's probably a result of my writing style, and I couldn't honestly say that my writing style hasn't evolved to suit WordStar anyway.

All in all then, I like VisiWord. It works well, is easy to use, and has a number of advanced features which really are usable. It should prove popular with existing Visi-users, plus those looking for power coupled with simplicity. ❑

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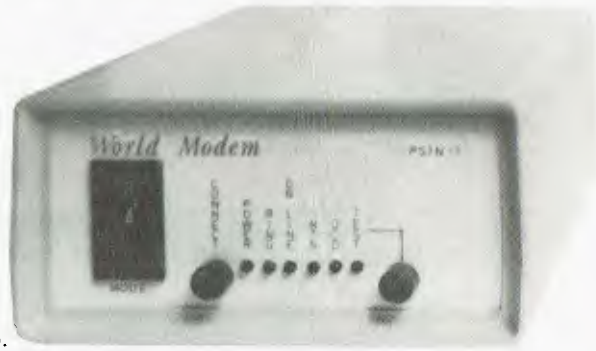

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HiSoft's Hi-Finance

Melbourne company HiSoft has been around for a couple of years now, and has quite a range of software on the market. It is the distributor of the recently reviewed KnowledgeMan package, which tells me that the people there know a good thing when they see one. It seems logical to suppose that they can write a good thing, too.

It was with this thought in mind that I approached their Hi-Finance general accounting package. This suite of programs is written in Microsoft BASIC for the IBM-PC, and includes debtors, creditors, general ledger and inventory modules.

Grabbing the manual off the shelf, I powered up the PC and booted the Hi-Finance system. This is done by a .BAT file which takes care of all the funny slashes and colons which BASIC wants when you have more than a few files open.

The system came up and asked for the password. I hunted through the manual for reference to the demo system password. No luck. Someone had forgotten to include it or it had got lost. No problem, I thought, having seen War Games the previous week; I'll go in through the back door.

After trying various words like SECRET, I decided that a more scientific approach was necessary. Starting a stopwatch, I set about cracking the system. In less than five minutes I was in, with a new password. I won't reveal how I did it, as that would be asking for trouble. But it wasn't difficult.

The whole question of passwords and security is a tricky one. I don't feel the HiSoft password scheme is any worse than most of those on the market, and in any case it doesn't have to be brilliant. It's mostly a deterrent for non-technical snoopers and browsers.

Anyway, I've suggested a simple encryption scheme to HiSoft which, for a few bytes of overhead in the code, will effectively hide the password information.

Inside the System

Having got the system up, I took a look around. The system obviously prompts for the date and then brings up a main menu. The user can choose from the debtors, inventory, creditors, general ledger, utilities and closing down.

The debtors subsystem (the most important to most people) is a balance forward system which stores transactions in the computer until the end of the month, when an end-of-month aging routine is run, which ages the current, 30 days and 60 days balances and deletes the current transactions, carrying the balance forward.

A result of this is that the user should strictly perform aging at the end of the month, and not part-way through a month; otherwise, it becomes difficult to track what's going on and auditing becomes hell.

The system prepares invoices automatically and posts the invoice details to the appropriate debtor account. It can also produce sales statistics, account status, commission details, and where the invoice is for goods (not services) will update the inventory files automatically too.

The debtors system is integrated with the general ledger, so that transactions are posted to the general ledger accounts where appropriate.

The debtor menu allows the user to maintain debtor accounts, adding and editing records as required. Debtors are accessed through a four-character code, which makes it easy to access the files – as long as you know the code.

Data entry provides for invoices, credit notes, receipts, and adjustments. The record structure is comprehensive, allowing for such details as commission rates and freight charges.

Several debtor reports are available, including a debtor list, aged debtors analysis, statements, invoice report and sales tax summary, commission report, transaction lists and labels. The reports can be sorted by agent, by debtor group number, for only active debtors, for only 'bill-to' accounts and for only a range of debtors.

The inventory system is integrated with the debtors and creditors subsystems, and has a range of features: sales tax rates, multiple selling prices, unit measure, qty on hand, qty for MTD and YTD, sales value statistics for MTD and YTD, cost statistics and re-order level.

Updates of stock as purchases are made are done automatically by the creditors module, which automatically updates the qty on hand, average cost price and the latest cost price. Products can be grouped, so that reports will be produced only for product groups specified.

Reports

A number of reports is available, including price list production, sales activity, stocktake sheet, inventory value report and a re-order report. Plus, of course, the data in the files and reports can be used for various kinds of ration analysis.

As with the debtors subsystem, the inventory module is menu-driven, using a number of screens. It seems to be quite easy to use (meaning I can use it) and the files have a considerable amount of data in them; certainly flexible enough for most small businesses.

The creditors subsystem, like the debtors, is a balance forward system, which uses an end-of-month routine to erase current transaction data and age the balances. The system will accept invoices, returns, payments, discounts taken, as well as adjustments. Invoices and returns automatically update the inventory system's files, saving a data entry step and possible errors.

The pattern of menus is very like the

SPECIFICATIONS AND REPORT CARD

Program:	Hi-Finance
Made by:	HiSoft
Useful for:	General accounting
Hardware required:	IBM-PC

Ratings	Excellent	Very Good	**Good**	Poor
Documentation:		•		
Ease of use:		•		
Speed:			•	
Functionality:	•			
Support:		•		
Value for money:		•		

Price:	$350 per module; $1400 all modules
Review copy from:	HiSoft, 8-12 Alma Rd, St Kilda 3182

debtors system, making it easy to learn.

The general ledger subsystem can be used as a stand-alone package or completely integrated with the other modules. The chart of accounts can be set up for the individual user, and displayed in a standard format which conforms to Australian accounting standards. While the system is primarily intended for a company, partnerships or sole traders can use it with only small changes to account headings.

Again, this is a balance forward system with entries held in the system until the end-of-month procedure is run. At this point, all month-to-date balances are zeroed and the brought forward balances are updated.

Data Entry

The system accepts three kinds of data entry: cash receipts, cash payments and journal entries. The system follows the standard double entry book-keeping practices, so the user should be familiar with these principles before using the system.

The user can set up the chart of accounts by responding to prompts from the system; ten account ranges are provided, to allow similar accounts, such as

Still trying to come to grips with double entry book-keeping, Les Bell is reliant as ever on computerised accounting systems. Here he looks at a recent entry, HiSoft's 'Hi-Finance'.

revenue, operating expenses and others, to be grouped together for reporting purposes. Certain accounts (control accounts) must be present for the system to work. Once the ledger has been created, the balances can be posted from an end-of-month trial balance.

The system can automatically produce a trial balance showing account numbers, expected sign, name, balance and totals of all debits and credits. The profit and loss option prints out a combined trading statement and P & L, showing month to date and year to date, plus last year's balances for all profit and loss accounts.

Finally a balance sheet can be produced, showing the company's current financial position. If a P & L has not already been generated, the balance sheet will automatically produce one in order to calculate the balance sheet correctly.

The utilities options allow the user to change the date, edit sales tax rates, update at end of month and end of year, produce a posting summary, edit the company details (name and address used in invoices and so on) and compact the files.

Impressions

My impressions of the system were that it was reliable and easy to use, and that the files were set up to hold sufficient data for all kinds of reports necessary for most small businesses. Installing a general ledger is obviously a step that should be taken in consultation with an accountant, but the Hi-Finance general ledger seems to be versatile enough for most small company structures.

The documentation is nicely produced, in a small ring binder with plenty of examples of screens and reports, together with some background explanation of what's going on.

In summary, then, the Hi-Finance software package should be seriously considered by anyone who wishes to automate the accounting of a small business. It is robust, and has enough features to cope with future requirements for some time to come. ❑

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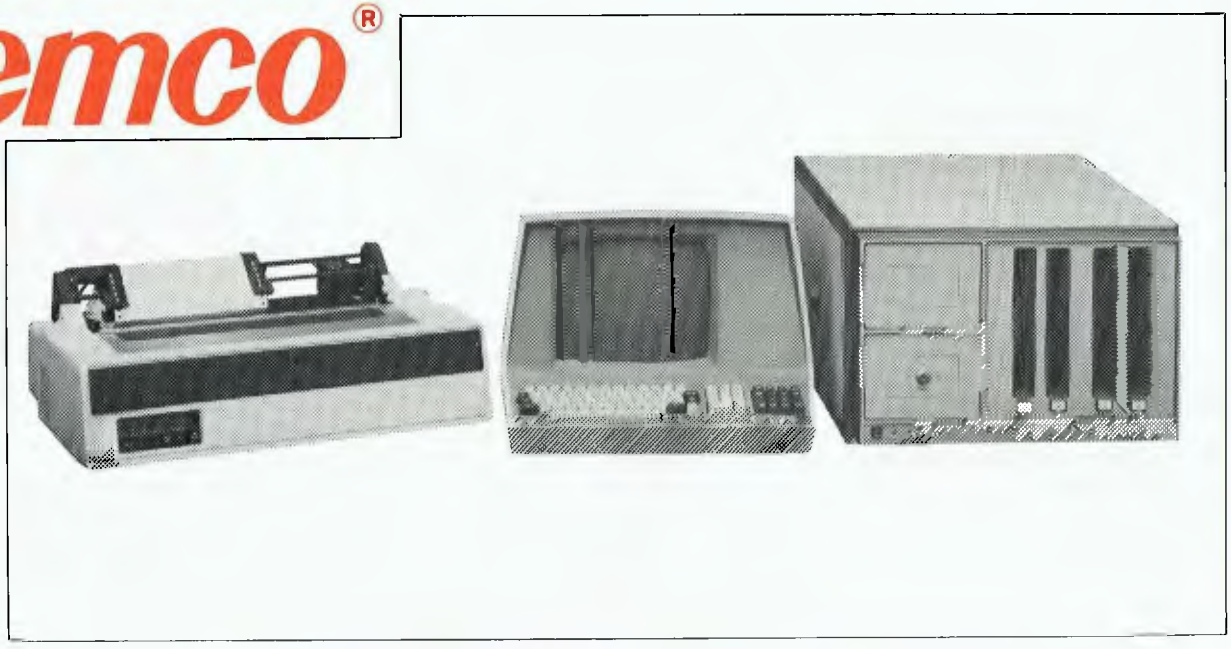

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Delta

DATA MANAGEMENT SYSTEM

One major problem with most languages, and many database systems are no exception, is that transaction files have to be linked to master files in a very obvious, tedious and sometimes difficult way. With dBase II, for example, it's usually a matter of copying a link field into a memory variable, SELECTing the SECONDARY database and then doing a FIND. The whole process can be rather awkward.

The Delta data management system is unique in that it takes care of this process automatically, for up to eight transaction types per record. The Delta record definition allows up to 90 fields or 2000 bytes, whichever limit you hit first, but as some of the fields are spread over the transaction files, the actual record length may be very much longer.

Written by Compsoft in the UK, the package has a very 'English' feel to it. That's difficult to explain, I know, but after reviewing so many software packages, I get a distinct national flavour from each one. (Interestingly, the Japanese seem to be much closer to the UK in programming style than they are to the US).

The package is available in CP/M, MP/M and MS-DOS versions, and the sample I used works on the IBM-PC under PC-DOS.

The underlying concept of Delta is that while it is possible to create flat file structures for many applications, they rapidly grow out of hand. For example, one could create a simple account file header containing client name, address, current balance, credit code, and other data using just ten or so fields. One could then use up the remaining fields in the record by allocating orderno1, partno1, qty1; orderno2, partno2, qty2; orderno3, partno3, qty3; and so on, simply repeating the required fields.

Of course, that would allow us to log up to 20 orders or so each month (assuming Delta's limit of 90 fields), but there are a couple of problems. First, every record is much bigger than it needs to be, since the average customer will place only a few orders each month. The unused fields contain blanks and waste space. Second, how do you cope with the addition of a new kind of transaction like payments? The whole thing gets unworkable.

The solution in conventional relational databases is to have a transaction file, in which each transaction record has a key field which relates it to a record in the master 'header' file. As mentioned above, this can sometimes be difficult to organise. In Delta, life is simpler. One simply marks a group of related fields as being repeated to contain transactions. Such a repeated group of fields is called a transaction group; up to eight groups are possible within a file definition. This converts a flat file structure into a multi-level file. Easy!

File Definition

File definition is a simple process, provided you have given it some forethought. It's largely a matter of responding to prompts about field lengths and types. Three types are supported: character fields, numeric fields, and date fields. Delta stores dates in its own date format, and the user can select one of five date formats for input and display, allowing dates to be input in European format and later printed in US style (incidentally, I've finally given in and adopted US format; the real-time clock of the computer uses it, my watch uses it, my calculator uses it – why fight?).

Once the field definitions have been entered, the user can display them, edit them, move fields around or print the file definition. Most importantly, he (she) can now allocate the transaction groups and format the blank file. This is done by specifying the last field of the file header and then the last fields in successive transaction groups. When you get to the last field of the file, you're done.

To use the file, one must now use a screen layout; in Delta terminology, a mask file. This is created using a full screen editor which allows the user to move around entering prompt lines or field names. On the IBM-PC version I had, the prompt line at the top of the screen was labelled with ↑H, ↑L, ↑K and ↑J, as would be used on a Lear Siegler or similar terminal; yet it responded not to those codes but to the normal IBM cursor pad. I only discovered that after a bit of fiddling, as the Num Lock key was set wrongly – a Num Lock indicator would be really useful at this stage.

The screen is split into two areas, for the header at the top and the transactions in the lower half of the screen. One has to toggle between header and transaction entry to gain access to the two halves of the screen.

Screen Mask Layout

Like the file description, the screen mask layout can also be sent to the printer. This is a useful feature for documenting applications as you develop them.

The screen mask can carry prompts, database fields and also work areas, which can contain intermediate results and derived values. Work areas are referred to by a carat symbol followed by their number, combined with the number of decimal places in the work area. This can be a bit confusing at first. For example, the process instruction:

BONUS = SALARY*↑1.2*#100

means salary times the percentage value in work area 1. Hmmm.

An interesting feature is the ability to associate passwords with many of the files in a Delta system, including the masks. This provides a high level of security: the data files won't make much sense without screens to translate them back into a viewable form.

Option 1 on the main menu allows the user to use the mask. Now the value of transaction groups becomes apparent. The header layout appears unchanged, but the transaction group is displayed repeatedly down to the bottom of the screen.

The header data can now be inserted; the master file is indexed on the first (key) field, which must be of character type and less than 55 characters in length. Similarly, transaction groups are indexed on the first field of the group.

This means that when a transaction is inserted into the file, it is entered onto the top line of the transaction area (the active area) and once it is completed, the display will be sorted into key sequence, so that the new entry goes to the appropriate place. The transaction group can be scrolled up and down so that it can extend off the screen.

The files are actually indexed using a B-tree technique which gave quite reasonable responses on the trial system. Obviously, as with most databases, a hard disk would be a worthwhile improvement.

The mask file gives the ability to enter and edit data, search for records and generally maintain them. The deletion facility can optionally be suppressed, providing yet another level of security.

Once a data file has been created, the data can be sorted and selected. Up to eight selection criteria can be applied,

Database management systems are not always the easiest packages in the world to learn to use. Les Bell examines one that is more user-friendly than most.

using field comparisons such as less than, equal to, or between, and joined by AND or OR relations. Only the header file and one transaction group can be used in the selection process at one time.

Some ingenious ideas have been applied here; again, the operation is completely prompted, following a 'Q & A' dialogue, yet it is not as tedious or inflexible as such procedures usually are. For example, a criterion can be entered as a constant when the select is first set up, or can be entered at run time. In the latter case, the select designer can insert a prompt which will appear before the operator at run time.

In addition, the user can select on the number of entries in any transaction group, which is maintained automatically by Delta.

Fields

For reporting purposes, files can be sorted on up to five fields or sub-fields at once, with (luxury) correct date sorting, regardless of the displayed date format. Another nice feature is that as part of record processing (that is, programming) the system can perform date arithmetic such as date plus days giving date, or calculating days between two dates. That feature alone will turn on a lot of potential users.

The system allows programs to be written using a simple record processing language which is basically oriented to arithmetic and weak in string handling. This looks less like a programming language and more like SAM76 or other macro processing languages. But it works, and is simple to use.

Among other facilities, it includes the ability to perform table look-ups for conversion factors; a kind of array with string indices (get it?). This particular facility gets around the need to hardwire a lot of magic numbers into the code, something that one is particularly tempted to do with array-less languages like dBase II. Basically, Delta doesn't need a programming language; it is a data and table-driven system.

However, the package does include an ingenious system of saving the user's keystrokes as he performs a task, then saving them on a disk file for future use. This provides an even higher level of programmability.

Delta includes a particularly powerful report generator, which also helps to eliminate the need for programming. Several reports are available: logging reports, like audit trails; screen dumps, for quick reference; labels; letters with Delta fields merged in; and more conventional reports.

Keeping track of transactions is a particular problem for many other databases, but one which Delta handles quite naturally. Like most other Delta activities, report generation is a 'Q & A' process, with the user supplying information about which fields to total, whether control breaks should eject to a fresh page, and so on.

Tailored reports allow considerably more flexibility in report layout, such as substring extraction, edited output and so on. Report specifications can be refined by editing them and saving them back to disk.

The form letter writer of Delta is quite neat, with some advanced features such as performing justification of adjusted text. The text editor also works well, in a similar way to the screen design editor. Labels can be printed up to five up, by answering a few simple questions.

Delta also includes LINK and COPY commands which allow the export and import of foreign files, as well as batch updating from other systems to the transaction groups of the Delta files. Files can be created for communication with WordStar/MailMerge or Spellbinder. The same commands allow Delta files to be redefined or split.

On the subject of file handling, backup and restore commands are built into Delta, rather than relying on the operating system's file copying utilities, which are often poorly documented and passeth all understanding of the user. Thus backup is up front on the main menu, and is documented in the manual.

Utilities Available

A number of utilities is also available for tasks such as rebuilding indexes, restructuring files and dumping files. Most users will have little use for these; however, the manual does contain some diverting little technical backgrounders that encourage the user to understand what he is doing, and why. I like that approach.

The documentation is very good, with a logical flow for first-time reading, yet a logical structure for reference. The inevitable forward references are pointed out as such, rather than leaving the reader wondering 'I don't remember reading that?'. An introductory appendix outlines the basics of using a microcomputer for the complete tyro. Other appendices provide useful suggestions and machine-specific data.

In summary, Delta has a number of things going for it. First, it hides the links between master records and transactions, so that the user is not forced to write programs. Secondly, it is versatile and responsive, although the Q & A sessions do tend to get a bit tedious sometimes. And finally, the date calculations alone are worth the price of admission. Lots of applications come to mind, like machine scheduling, service records, and others.

Delta is a worthwhile alternative to dBase and the other databases. Its unique features will guarantee it a place on the market for some time to come.

Our review copy was supplied by Intelligence (Australia). ❑

SPECIFICATIONS AND REPORT CARD

Program:	Delta
Made by:	Compusoft
Useful for:	Database management, small business
Hardware required:	CP/M system with two disks, or IBM-PC, Sirius, NEC-APC or similar

Ratings:	Excellent	Very Good	Good	Poor
Documentation:		•		
Ease of use:	•			
Speed:		•		
Functionality:	•			
Support:		•		
Value for money:		•		

Price:	$950 incl. tax
Review copy from:	Intelligence (Australia) Pty Ltd

Chameleon Blends with IBM-PC

Chameleon (above) claims that it is 'the world's first IBM-PC compatible portable computer that features a dual 8 and 16-bit processor'.

Chameleon,
n. Small prehensile-tailed long-tongued lizard with power of changing colour and of living long without food; inconstant person.

The answers were: (1) it's pronounced with a hard 'k', with the accent on the second syllable (Kameel'eon), and (2) it blends in with most software by allowing the use of both 8-bit software (using C/PM-80) and 16-bit software (using MS-DOS or PC-DOS). It does this by dual processors, the Z80A and the 8088. (The 8088 runs at 5 Mhz, whereas the IBM runs at 4.77 Mhz. I'd be surprised if such a difference would be very noticeable.)

Chameleon's claim is that it is "the world's first IBM-PC compatible portable computer that features a dual 8 and 16-bit processor".

The Chameleon is a neat package, with a 23 cm (9 inch) green screen flanked by two vertical 13 cm (5.25 inch) disk drives. The whole unit is tilted by propping it up with the carrying handle. The keyboard forms the top cover of the machine, and then folds down to become fully detached. It's the same design as the IBM keyboard, although it does have status lights for the CAPS LOCK and NUM LOCK keys, and has a light touch, which I prefer.

The Chameleon's screen display is quite clear and sharp, although it becomes more difficult to read from an angle. When scrolling it seems to 'bounce' as each line comes onto the screen, which I found to be disconcerting. It also displayed what appeared to be vertical retrace lines floating across the screen, but Horizon assured me this fault was confined to the machine available for review.

Horizon is marketing two versions of the Chameleon: the Model 1 with two single-sided drives and the Model Plus with two double-sided drives. These give 180K and 360K respectively with MS-DOS 2.0.

Although the Chameleon is touted as being a portable, 'transportable' seems a better description. It weighs in at 12.5 kg (28 lbs). This compares with the Compaq, also 12.5 kg, and the Osborne and Kaypro at 11.8 kg each.

Expansion

One of the criticisms levelled at the IBM-PC was the limitation of having only five expansion slots, one of which would be used up by the diskette drive adapter and a second by the display/printer adapter. On-board memory was also limited originally to 64K, requiring a third adapter for any additional memory.

Seequa, the designers of the Chameleon, have adopted a different approach. They have provided no on-board expansion slots – an expansion chassis with eight slots is due for release later. The basic model Chameleon has 128K RAM (expandable internally to 256K) plus a serial RS-232 port and a parallel printer port. The Chameleon Plus comes with 256K RAM as standard. So, the standard hardware configuration is quite complete

The Chameleon computer is distributed in Australia by Horizon Computer Corporation. When John Nicholls spoke to Glynne Willey of Horizon, the first things he wanted to know were: (1) how you pronounce the name, and (2) why it bears that name.

and would probably meet most requirements.

On the software side, Horizon has also striven to provide a complete package for the purchaser. MS-DOS 1.1 is standard (I assume by the time this review appears MS-DOS 2.0 will be provided) as well as Microsoft BASIC, Perfect Writer and Perfect Calc. On the Chameleon Plus, you receive in addition Perfect Seller, Microsoft's GWBASIC, the Condor Database Management System, and Seequa's communication system.

The two Chameleon models with the software described should be available now. The prices are $3995 for the Chameleon 1 and $5495 for the Chameleon Plus. To add an 80-column dot-matrix printer you'd be looking at about $800, plus that essential but extremely expensive 'option', a printer cable at $85.

Future Releases

Seequa has ambitious plans for the Chameleon, and the list of products to be released is an impressive one. Unfortunately, at the time of writing that's all they were – 'to be released'. For what it's worth, the list includes:

- a 10M hard disk
- C/PM-86 16-bit operating system
- a colour monitor interface
- the 8087 math co-processor
- a modem and communication/terminal package
- two battery packs (one is 'uninterruptible').

Perfect software has been mentioned before in these pages; because the various packages have been designed to work together, the manufacturers claim that 70 per cent of the commands are the same throughout the range.

Windowing is used extensively, to allow several files to be displayed and edited at the same time. Error messages are extremely polite ("One of us must have made an error") and more importantly, give hints on what to do next.

Menus have unique first characters (as with Lotus 1-2-3), so any choice may be selected with only one keystroke. Help messages are provided, but are not 'context-sensitive'; that is, you get the same information regardless of what action you are performing and want help on. Documentation is comprehensive.

On most systems, menus are either 'painted' line by line or come on the whole screen at once; on the review system they came on at a reduced size and then appeared to zoom closer until they assumed their full size. Curious, but not really a problem.

Who Will Use It?

Horizon sees two main markets for the Chameleon: first, as a transportable – sorry, portable – machine for use at home; second, as an upgrade for someone making the change from 8-bit technology and CP/M.

If you want a home machine to use as an alternative to the IBM-PC in your office, you would need to see how far Chameleon's claim for compatibility stands up. I tried three PC-DOS 2.0 programs to see what would happen.

The first, a completely standard one, worked without the slightest trouble. The second, also standard, left the Chameleon spinning its disk on MS-DOS, but loaded without trouble on PC-DOS. I doubted the third program would work. It had three parts, a .COM file to change the defaults on the Caps Lock and Num Lock keys, an .EXE file called ProKey, which I use to change the meanings of the function keys, and finally, a text file to prompt for the next step. To my surprise, the first part loaded successfully, but then it ground to a halt and wouldn't load ProKey.

This brief test shows the three types of results you can expect from an IBM-compatible computer. If you want to use a piece of IBM software, it'd be a good idea to try it out on the Chameleon before buying it. Provided the designers haven't used any non-standard DOS features, it should work.

The main features of the Chameleon are its compact size and its ability to run most 8-bit and 16-bit software. Whether this combination will attract enough buyers in a crowded market remains to be seen. ❑

SPECIFICATIONS AND REPORT CARD

Unit:	Chameleon
Made by:	Seequa Computer Corp (USA)
Distributed by:	Horizon Computer Corp, 7-9 Merriwa St, Gordon NSW 2072. (02) 498-6611.
Processor:	8088 and Z80A
Clock speed:	5 MHz and 2.5 MHz
RAM:	128K or 256K
ROM:	8K (expandable to 40K)
I/O:	Video out, one serial port, one parallel port
Operating system:	MS-DOS, (CP/M-80, CP/M-86 options)
Languages:	MBASIC-86, FORTRAN, C, Pascal, COBOL, PL/1, FORTH, LISP, Assembler
Keyboard:	83-key IBM-PC layout
Display:	23 cm, 80 by 25 or 40 by 25, green
Graphics:	640 by 200 pixels monochrome, 320 by 200 pixels colour
Peripherals:	Printer, battery pack, hard disk, expansion chassis (still to be released)
Best points:	8-bit and 16-bit software, compactness
Worst points:	12.5 kg

Ratings	excellent	very good	**good**	**poor**
Documentation:		•		
Ease of use:		•		
Functionality:			•	
Support:			•	
Value for money:		•		

Price:	Chameleon 1 (128K, single-sided drives): $3995 incl. tax Chameleon Plus (256K, double-sided drives): $5395 incl. tax.

Collyn Rivers describes how to use one of spreadsheet programs' most useful yet least understood functions.

Look-up Tables

Innumerable magazine articles and reviews have rightly praised the power, ease of use and versatility of spreadsheet programs such as Visicalc, Supercalc, Calcstar and Multiplan. Curiously, few, if any, have mentioned (let alone described) one of this family of programs' most useful functions – LOOKUP tables.

The LOOKUP function enables tables of 'values' to be maintained within a spreadsheet program. These tables may be accessed upon command, and data therein automatically transferred and entered as required in other parts of the spreadsheet. This facility may be used for words, scientific formulae, logic values and numbers. Data may consist of fixed values or values dependent on the results of other calculations or formulae.

Figure 1 shows the basic concepts – using as an illustration the number of 'turns per inch' that may be wound onto a transformer bobbin using varying gauges of wire.

The LOOKUP table is held in the cell block A12:B32. Column A12:A32 contains wire gauge sizes from 20AWG to 40AWG. Column B12:B32 contains the corresponding 'turns per inch' for each gauge of wire.

The 'variable' (wire gauge) is entered at D5. The LOOKUP formula is stored at D6 (Figure 1). In this example the formula instructs "Take the variable entered at D5 and compare it with the numbers (wire gauges) in column A12:A32. Then select the number in that column which is equal to the variable in D5, or if there is not an exact match, then the number which is one number less than the closest numbers in A12:A32. Now take the value from the cell on the immediate right of that just selected (turns per inch) and enter that value in D6."

In this instance the number in cell A13 is identical to the variable, and the value held in cell B13 is therefore selected and entered in D6. Figure 2 shows the LOOKUP formula used – note that the formula includes a multiplier (*2.25) to cater for the bobbin width.

An Invoicing Program

A completely different example is shown in Figures 3 and 4. This is an invoicing program in which details of individual item prices and the total order value discount schedule are held in two separate LOOKUP tables – (A29:B40) and (C29:D40) respectively.

The user needs only to enter customer details, order quantity and catalogue number for each item sold. The program will then fill in the unit and total cost of each category of goods, calculate the invoicing sub-total, calculate the discount applicable to that amount via a quantity/discount (variable) scale, subtract that amount from the sub-total and finally calculate the total invoicing price.

The program commences by referring to the first LOOKUP table for each catalogue number concerned and transferring the relevant unit prices to the unit cost positions on the upper part of the invoice. The simple formulae held in column D then multiply the unit costs by the quantities ordered. The discount applicable to the total order value is calculated automatically by comparing the sub-total (D21) with column C29:C40 in the second LOOKUP table and seeking the closest match equal to or less than the next higher number therein.

In the example shown the sub-total of $11,897.04 is greater than $10,000 but less than $50,000. Thus the $10,000 value is chosen – corresponding to a discount of 20 per cent. That percentage is written in cell C22 and entered as a dollar quantity in D22.

Finally the program subtracts the discount figure from the sub-total and enters the total price payable in cell D23.

In this example a third LOOKUP table could have been added to enter the description of each item ordered – the operator having merely to key in the relevant stock code as before.

Other uses for the LOOKUP function include calculating income tax, having first entered the relevant tax structures as a LOOKUP table; 'days in the month' tables for scheduling applications; atomic weight tables; calculating thickness of insulating materials for required 'R' values; or choosing materials for required 'R' values; or choosing the closest 'preferred' component values in electronic circuit design.

Watch For The Traps

There are a few constraints and also a few traps for the unwary. The LOOKUP table may be entered either vertically or horizontally, but either way the 'values' column or row must be entered in ascending order from top to bottom or left to right.

Difficulties may also be encountered if the variable (for example D5 in Figure 1) is smaller than the smallest corresponding value in the left-hand column – or upper row – of the LOOKUP table. Where this occurs the value will be presented as NA (Not Available) or ERROR. The uncompleted rows A17 and A18 in Figure 2 are examples of how such problems can arise. In this example the problem has been avoided by entering zeros in the first row of the LOOKUP table (A29-D29). This also ensures that if a catalogue number lower than the lowest used is inadvertently entered then the price value 'zero' will be returned.

Correspondingly if the LOOKUP table does not contain a value as large as that sought for the variable then the largest value in the table will be selected. This may introduce an error if a variable (for example catalogue number in Figure 2) larger than the largest in the LOOKUP table is accidentally entered.

To safeguard against this it is advisable to enter an extra number (one digit larger than the largest required number) and assign it a value of zero. This is shown in A40:B40 in Figure 3. This technique ensures that if a catalogue number higher than (in this instance) 120 is entered then the price value 'zero' will be returned. If this is not done, entering a catalogue number higher than 120 will result in the price value '0.76' being returned.

The only practical limit to the number of LOOKUP tables that may be used in any one spreadsheet is the amount of RAM available to work with. Using Visicalc or Supercalc this is about 30K running under CP/M.

The examples shown here have been prepared using Supercalc; however, all will work equally well with Visicalc, Multiplan and other spreadsheet programs. ❑

```
   |   A   ||   B   ||   C   ||D|
 1|LOOKUP TABLE EXAMPLE
 2|TRANSFORMER BOBBINS
 3|AVAILABLE WINDING WIDTH 2.25"
 4|----------------------------
 5|ENTER REQUIRED WIRE GAUGE    21
 6|TURNS PER LAYER WILL BE:     74
 7|
 8|LOOKUP TABLE
 9|-------------
10|
11|GAUGE     TURNS/INCH
12| 20         29.4
13| 21         33.1
14| 22         37
15| 23         41.3
16| 24         46.3
17| 25         51.7
18| 26         58
19| 27         64.9
20| 28         72.7
21| 29         81.6
22| 30         90.5
23| 31         101
24| 32         113
25| 33         127
26| 34         143
27| 35         158
28| 36         175
29| 37         198
30| 38         224
31| 39         248
32| 40         282
33|--------------
34|LOOKUP1
```

Figure 1 (far left).

```
   |   A   ||   B   ||   C   ||           D
 1|LOOKUP TABLE EXAMPLE
 2|TRANSFORMER BOBBINS
 3|AVAILABLE WINDING WIDTH 2.25"
 4|----------------------------
 5|ENTER REQUIRED WIRE GAUGE    21
 6|TURNS PER LAYER WILL BE:     LOOKUP(D5,A11:A32)*2.25
 7|
 8|LOOKUP TABLE
 9|-------------
10|
11|GAUGE     TURNS/INCH
12| 20         29.4
13| 21         33.1
14| 22         37
15| 23         41.3
16| 24         46.3
17| 25         51.7
18| 26         58
19| 27         64.9
20| 28         72.7
21| 29         81.6
22| 30         90.5
23| 31         101
24| 32         113
25| 33         127
26| 34         143
27| 35         158
28| 36         175
29| 37         198
30| 38         224
31| 39         248
32| 40         282
33|--------------
```

Figure 2 (left).

Figure 3 (below left).

Figure 4 (below).

```
   |   A   ||   B   ||   C   ||   D   |
 1|
 2|INVOICE NO:                LOOKUP LTD
 3|DATE:                      8 FLOPPY RD
 4|CUSTOMER NAME:             TORONTO
 5|ADDRESS:
 6|CITY:
 7|STATE:
 8|---------------------------------------
 9|QTY     CAT.NO. UNIT COST TOTAL COST
10| 5500    112     .96       5280.00
11| 1000    115     3.98      3980.00
12| 39      112     .96       37.44
13| 540     117     3.79      2046.60
14| 500     119     .21       105.00
15| 450     120     .76       342.00
16| 100     113     1.06      106.00
17|                 0         0
18|                 0         0
19|---------------------------------------
20|
21|SUB TOTAL                  11897.04
22|DISCOUNT          20       -2379.41
23|TOTAL                      9517.63
24|---------------------------------------
25|PRICE TABLE      DISCOUNT TABLE
26|
27|CAT.NO. PRICE    ORD.VALUE DISCOUNT %
28|---------------------------------------
29| 0       0        0         0
30| 111     .87      50        2.50
31| 112     .96      100       5.00
32| 113     1.06     250       7.50
33| 114     .52      500       10.00
34| 115     3.98     1000      12.50
35| 116     6.95     2500      15.00
36| 117     3.79     5000      17.50
37| 118     .87      10000     20.00
38| 119     .21      50000     25.00
39| 120     .76      100000    30.00
40| 121     0        500000    35.00
41|---------------------------------------
42|LOOKUP2
```

```
   |   A   ||   B   ||                C                ||   D   |
 1|
 2|INVOICE NO:                                          LOOKUP LTD
 3|DATE:                                                8 FLOPPY RD
 4|CUSTOMER NAME:                                       TORONTO
 5|ADDRESS:
 6|CITY:
 7|STATE:
 8|-----------------------------------------------------
 9|QTY     CAT.NO. UNIT COST                            TOTAL COST
10| 5500    112     (LOOKUP(B10,A29:A40))               A10*C10
11| 1000    115     (LOOKUP(B11,A29:A40))               A11*C11
12| 39      112     (LOOKUP(B12,A29:A40))               A12*C12
13| 540     117     (LOOKUP(B13,A29:A40))               A13*C13
14| 500     119     (LOOKUP(B14,A29:A40))               A14*C14
15| 450     120     (LOOKUP(B15,A29:A40))               A15*C15
16| 100     113     (LOOKUP(B16,A29:A40))               A16*C16
17|                 LOOKUP(B17,A29:A40)                 A17*C17
18|                 (LOOKUP(B18,A29:A40))               A18*C18
19|-----------------------------------------------------
20|
21|SUB TOTAL                                            SUM(D10:D19)
22|DISCOUNT          LOOKUP(SUM(D10:D18),C29:C40)       -SUM(D10:D19)*C22/1
23|TOTAL                                                SUM(D20:D22)
24|----------------------------------- -
25|PRICE TABLE      DISCOUNT TABLE
26|
27|CAT.NO. PRICE    ORD.VALUE                           DISCOUNT %
28|-----------------------------------------
29| 0       0        0                                  0
30| 111     0.87     50                                 2.5
31| 112     .96      100                                5
32| 113     1.06     250                                7.5
33| 114     .52      500                                10
34| 115     3.98     1000                               12.5
35| 116     6.95     2500                               15
36| 117     3.79     5000                               17.5
37| 118     .87      10000                              20
38| 119     .21      50000                              25
39| 120     .76      100000                             30
40| 121     0        500000                             35
41|-----------------------------------------
```

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Word Games With 'The Word'

Les Bell reviewed 'The Word Plus' spelling checker and word teasing package in the October issue. Jeff Richards has found yet another useful application for this software – one particularly useful for playing word games.

THE 'TOOLS' supplied with 'The Word Plus' word processing utility package from Oasis Systems provide just about every utility for spelling checking and word usage that could be imagined. But there is one facility lacking: it would be nice to be able to work sequentially through the dictionary accepting or rejecting entries according to some user-specified rule.

Such a facility would be handy, for example, to answer a question of the style "What words of five letters or more can be made out of the letters of *Your Computer*". The program presented here permits the dictionary to be listed from beginning to end, and the insertion of the necessary tests on each word would allow a question such as the one above to be easily answered.

The storage format of the dictionary is extremely compact, but not particularly complex. It is based on the fact that in an alphabetical word list most words contain some of the left-most characters from the previous word. Therefore, a new word can be defined by identifying the number of characters to be retained from the previous word, plus the new characters for the current word.

Each word is stored as a sequence of one or more bytes. The first byte of each word can be in one of two forms. If bits 6 and 5 of this byte are zero, then the value of the byte (bits 4 to 0) is the number of characters of the previous entry that are to be preserved. In this case, there must be at least one additional byte in the word, to indicate the character(s) to be added to create the new word.

The second form of the first byte has bits 6 and 5 set to 01, 10 or 11. These values mean that three, four and five characters respectively are to be retained from the previous word. The first character to be added is stored in bits 4 to 0 as its ASCII value less 41h (that is, A = 0, B = 1 and so on – all dictionary entries are capitalised). This means that in the case of three, four or five characters from the previous word being retained for the next word, then two items of information are being encoded into one byte – the characters to retain and the next character to add. This situation will represent a large proportion of the dictionary, and the storage for these words will be very efficient.

In both cases, subsequent characters to be added to complete the word are stored one per byte, again in bits 4 to 0 as the ASCII value less 41h. The last byte of the word has bit 7 set. This could also be the first byte of a word if it has

```
7              65             43210

A3   1 =FIRST/LAST 01 =RETAIN 3   00011 ="D"   BAN+D      =BAND
44   0 =FIRST      10 =RETAIN 4   00100 ="E"   BAND+E
83   1 =LAST       00             00011 ="D"         +D    =BANDED
48   0 =FIRST      10 =RETAIN 4   01000 ="I"   BAND+I
0D   0 =MIDDLE     00             01101 ="N"         +N
86   1 =LAST       00             00110 ="G"           +G=BANDING
07   0 =FIRST      00 =COUNT      00111 =7      BANDING
92   1 =LAST       00             10010 ="S"           +S  =BANDINGS
D2   1 =FIRST/LAST 10 =RETAIN 4   10010 ="S"   BAND+S      =BANDS
```

Figure 1.

been formed by adding one character to a stem of three, four or five characters.

The first entry for a word is identified simply by being the next byte after the end of the previous word. For example, if the previous entry was BAN, the sequence will be as in Figure 1.

Incidentally, the first three bytes of the dictionary are all zero. If you can work out how this translates into 'AA' then you can claim to understand the dictionary format.

your computer

SOFTWARE REVIEW

Working Through The Dictionary

The program presented here (Listing 1) works through the dictionary as a byte stream applying the above rules to extract the words. The current word is established with a fixed length of 20 characters. When the pointer is reset on the first byte of a new word the discarded characters are reset to '?'. New characters are then inserted into the word at the position indicated by the byte pointer COUNT.

The program could be made a little more efficient if the word was built by adding letters to the stub, rather than inserting into a fixed-length string, but the approach used here more closely describes the actual machine language routine used in 'The Word Plus'.

Listing 2 is the additional code needed to answer a question such as the one posed at the beginning. In this case it has also been assumed that letters from the test string cannot be used more than once. Hence the letters in the test string are replaced by '#' when they are matched with a letter in the word being evaluated. Notice also that the backslash is used instead of the apostrophe in dictionary entries such as 'I've' and that possessive forms of words are not included in the dictionary. □

```
10  REM DICTIONARY SEQUENTIAL LIST
20  OPEN "R",#1,"MAINDICT.CMP",128
30  REC=2  'RECORD 1 IS POINTERS
40  BIT7=1 'FIRST BYTE STARTS A WORD
50  WORD$="????????????????????"
60  FIELD #1, 128 AS REC$
80  GET #1,REC
90  IF EOF(1) THEN STOP
100 FOR I=1 TO 128
110  I$=MID$(REC$,I,1)
120  J=ASC(I$)
130  ENDFLAG=BIT7
140  BIT7=0:IF J AND 128 THEN BIT7=1
150  BITS65=((J AND 127)-(J AND 31))/32
170  I$=CHR$((J AND 31)+65)
180  IF ENDFLAG<>0 GOTO 220
189  REM MIDDLE OR LAST
190  MID$(WORD$,COUNT,1)=I$
200  COUNT=COUNT+1
210  GOTO 320
219  REM FIRST
220  IF BITS65=0 GOTO 280
239  REM 3,4 OR 5 RETAINED
230  COUNT=BITS65+3
240  FOR I1=COUNT TO 20
250  MID$(WORD$,I1,1)="?"
260 NEXT I1
270 GOTO 190
279 REM <3 OR >5 RETAINED
280 COUNT=J+1
290 FOR I1=COUNT TO 20
300  MID$(WORD$,I1,1)="?"
310 NEXT I1
320 IF BIT7=0 GOTO 380
329 REM WE HAVE A COMPLETED WORD
330 FOR I1=1 TO LEN(WORD$)
340  IF MID$(WORD$,I1,1)="?" THEN GOTO 370
350 NEXT I1
360 STOP 'WORD LENGTH >20
369 REM INSERT ANY SPECIAL PROCESSING HERE
370 PRINT LEFT$(WORD$,I1-1)
380 NEXT I
390 REC=REC+1
400 GOTO 80
```

Listing 1.

```
370 I$=LEFT$(WORD$,I1-1)
371 IF LEN(I$)<5 GOTO 380
372 TEST$="YOURCOMPUTER"
373 FOR I1=1 TO LEN(I$)
374  PS=INSTR(TEST$,MID$(I$,I1,1))
375  IF PS=0 GOTO 380
376  MID$(TEST$,PS,1)="#"
377 NEXT I1
378 REM ALL LETTERS MATCHED!
379 PRINT I$
```

Listing 2.

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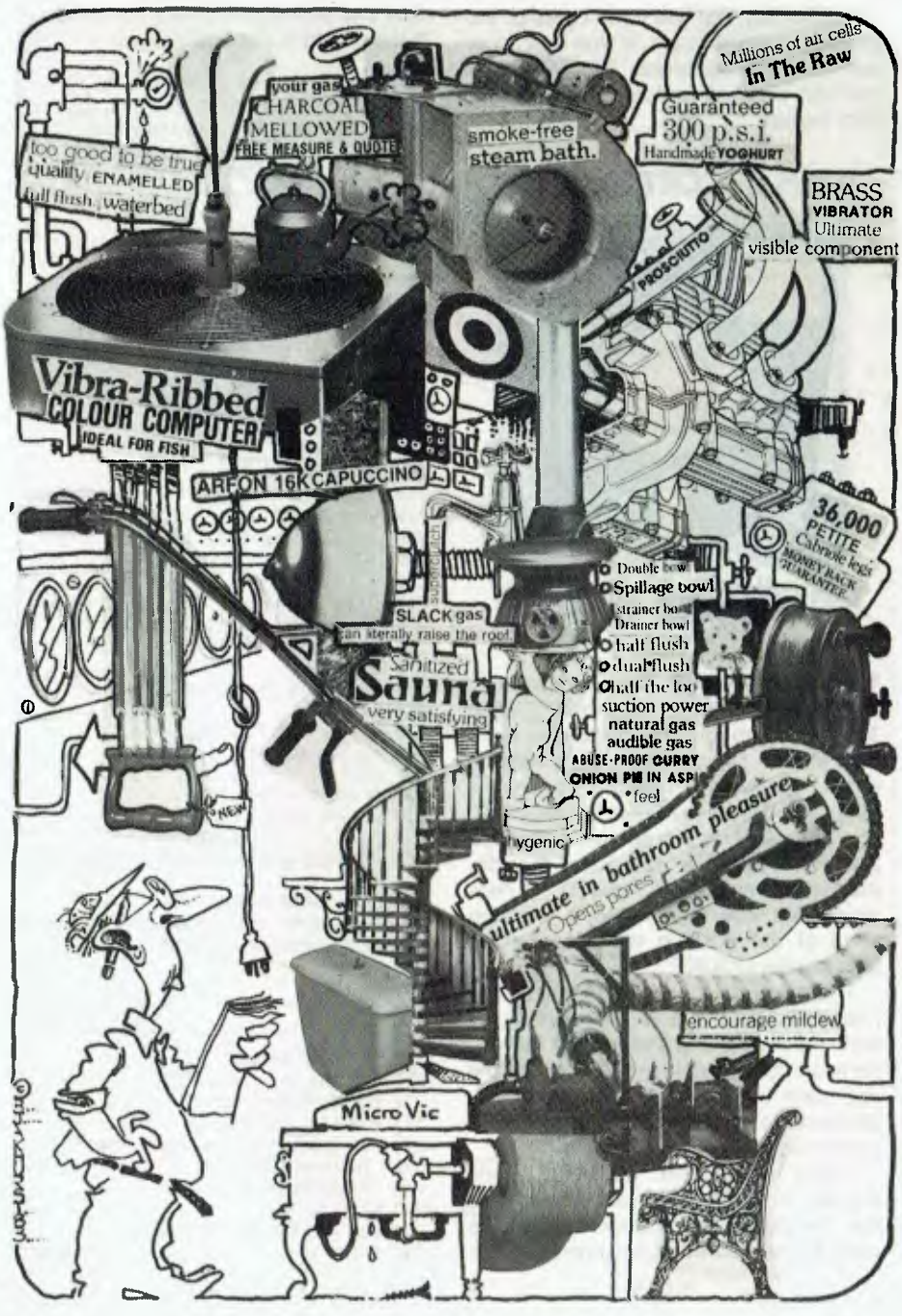
System Expansion
Part I

The When And How Of Adding Things On

So you've just come home with your new Microvic, and you can't wait to add on that printer-disk-lightpen-cassette-modem-plotter. Fine, but just how much do you really know about your machine? Roy Hill attempts to answer the question . . .



DO YOU KNOW the difference between ROM and RAM? Do you know what an address bus and a data bus is? If you know all these things, then you're probably ready to start adding to your system.

If you don't know what I'm talking about, then I suggest the following approach to bring you up to this stage:

1. Read the BASIC manual that came with your machine until you know it inside out.
2. Read Les Bell's "Understanding Assembler" and "BASIC For Bird-Watchers" series in *Your Computer.*
3. Read Bob Howell's article "RAM Cram Techniques For Atari" in the August 1981 edition of *Creative Computing.* It is an excellent article on efficient programming.
4. Beg, borrow or buy a copy of the machine's 'Chip Specific' book – phone Prentice-Hall for prices and authors.
5. Likewise, grab hold of a copy of *101 BASIC Computer Games* by Ahl. About 90 per cent of these will fit into a four-kilobyte system.

Then try cramming in the rest, using Howell's tips.

If you follow these steps religiously, come back and see me in six months, and we'll be ready to start talking system expansion.

I'll now start my attempt to explain, in relatively plain English, how to expand your system.

Regardless of the make, size or type of your machine, it must communicate

with both its own internals and with you, the operator. It does this with two "buses" (or busses) which carry information from one part of the machine to another, and to you.

The first bus to consider is the address bus. In most personal computers, this bus has 16 lines, which are usually labelled A0 to A15. With these 16 lines, the microprocessor can store or recall information from 2 to the power of 16 different bytes (or storage locations) in its memory.

Memory Map

Because the microprocessor is usually the only source of addresses, the address bus is said to be 'uni-directional' - an address is only generated by the microprocessor, not by any of the support chips. Thus, the 2 to the power of 16 bytes of memory (that is, 65536 bytes or 64 kilobytes) represent the computer's total accessible memory. I will explain later how we can "fool" the computer into thinking it has more.

This total memory allocation is important, because we divide this up into ROM and RAM. The more we have of one, the less we can have of the other. It is absolutely necessary to have a memory map of your machine. This will tell you not only which locations are ROM and which are RAM, but will also tell you what sort of ROM is provided – Monitor, BASIC or other. More about this later, too.

In one way or another, the address bus will also have to communicate with you. This is commonly known as input/output (I/O), and the manner in which input/output is handled depends on the particular type of micro involved. The '80-type chips (Z80 and 8080) have a special input/output register into which all information destined for the outside world is loaded. This means that we must have special input/output instructions if we are using this type of chip.

The other input/output philosophy is to treat the input/output chip as if it were ROM or RAM, and store information in it accordingly. This type of input/output is called memory-mapped input/output because it uses a small portion of its memory for input/output purposes.

The former type is called register-orientated input/output, because it uses special registers and instructions to accomplish input/output. I'm more familiar with the memory-mapped input/output, so I will be using it as my example.

The memory map for my system is shown in Figure One.

The input/output in this system is split into two sections:

1. System I/O: This is the input from the hexadecimal keypad and the output to the on-board LED display. If the user has a QWERTY keyboard and television

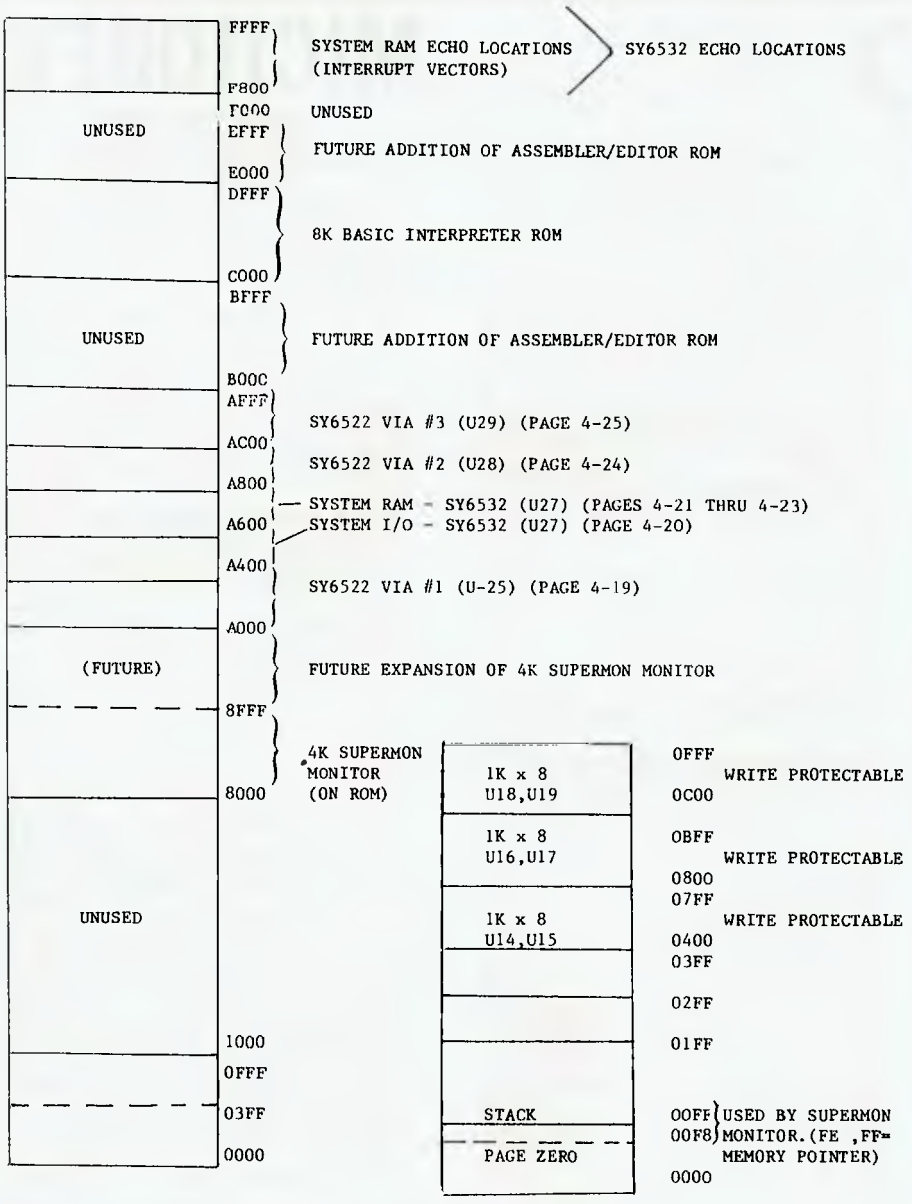


Figure 1. Standard memory map, SYM-1. (Courtesy Synertek Systems Corp.)

screen instead, the Supermon monitor will automatically re-route the input/output to these devices. The system input/output is handled by a 6532 RIOT (RAM-I/O-TIMER)

2. User I/O: This is the input/output that the user can configure to his own needs. It may include a printer, disks, modem and so on, and is handled by the three VIAs (versatile interface adaptors).

Musical Note

There is another type of input/output that I've ignored until now. This is the humble cassette that is probably your first and most important system addition, for without it you have no means of permanent storage. I'm going to spend a little time now discussing how an analogue audio-type tape can be used for the storage of computer-type digital information.

Each individual computer has its own refinements (such as breaking a large block of data into smaller sections – say, one kilobyte). However, all cassette input/output can be reduced to a fairly simple concept. The data to be stored on the tape (by 'data', I mean both programs and information) is converted from its history form (that is, either 0s or 1s) into a crude sine wave, or musical note.

A digital 1 is represented by a note having a frequency of 1400 Hz and a digital 0 is represented by a note having a frequency of 700 Hz. Regardless of ▶

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Note: This eprom resides in NET and must run in conjunction with UTILIPAK I

SUMMARY OF COMMANDS FOR THE UTILIPAK 1 EPROM

• Convert any decimal number to hexadecimal — Dec. to hex conversion • Load tapes ignoring auto execute • Find string of ASCII characters • Jump to mem. location • Intelligent address hunt • Write a tape in TRS80 or System 80 format • Read a tape in TRS 80 or System 80 format • Renew basic program • Search for a range of opcode • Set breakpoint for trace function • Trace through program, display registers and opcodes • Relocate machine code with optional offset • Disassemble machine code (includes unpublished mnemonics) • Find a routine by fingerprinting it • Select printer options

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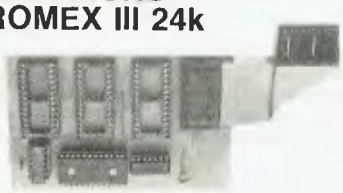

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6 sec. of SYN chars.	*	ID	SAL	SAH	EAL +1	EAH +1	DATA	/	CKL	CKH	EOT	EOT

6 sec. of SYN (16 Hex) - Allows the tape to advance beyond the leader and creates an inter-record gap. (Controlled by TAPDEL $A630.) Filled with ASCII synch characters that allow the SYM-1 to synchronize with the data stream.

* (2A Hex) - ASCII character that indicates the start of a valid record.

ID - Single byte that uniquely identifies the record.

SAL - Low order byte of the Starting Address from which data was taken from memory.

SAH - High order byte of the Starting Address from which data was taken from memory.

EAL +1 - Low order byte of the address following the Ending Address from which data was taken from memory.

EAH +1 - High order byte of the address following the Ending Address from which data was taken from memory.

DATA - Data bytes.

/ (2F Hex) - ASCII character that indicates the end of the data position of a record.

CKL - Low order byte of a computed checksum.

CKH - High order byte of a computed checksum.

EOT (04 Hex) - ASCII characters that indicate the end of the tape record.

Figure 2. Audio tape formats.
(Courtesy Synertek Systems Corp.)

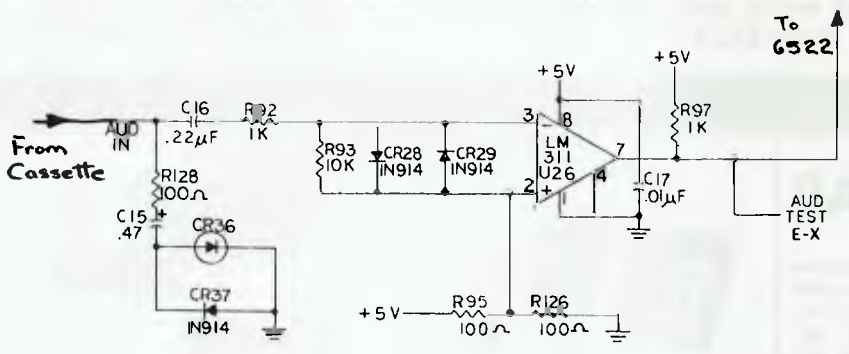

Figure 3. Audio cassette interface schematic.
(Courtesy Synertek Systems Corp.)

the computer used, it is conventional to have one digital bit twice the frequency of the other. However, before we ever start recording any information on our tape, we have to consider several important requirements:

1. At what rate will our information be stored on the tape?

2. How will our computer tell the difference between information and garbage? (It can't keep Chopin' from one side to another.)

3. Where is the information to come from in the computer's memory?

The first requirement is limited by the frequency response of both our tape and the tape recorder. The information is stored on the tape in serial form (one bit follows another) and, thus, the baud rate (the number of bits transferred per second) will depend on these factors.

The 'standard' rate for cassette systems, known as the Kansas City Standard, is 300 baud. I think this is a disastrous rate – my ordinary $80 cassette recorders (one from Tandy, one from Dick Smith) both work perfectly at 3000 baud, and I know of some people with higher-quality decks running at an astounding 5920 baud. At these speeds, who needs $1000 disk systems? My normal transfer rate, however, is a comfortable, slow 1480 baud (185 bytes per second), and an eight-kilobyte block only takes one minute to load and record.

Requirements two and three are accomplished by referring to Figure Two.

The synch character is 16 hex, and the computer uses this to recognise the start of a legitimate record. The rest of the format should be self explanatory.

Simplest Method

So much for recording the information on the tape. Now, how do we get it back? Perhaps the simplest and most reliable method is to use an LM311 comparator, and a pair of back-to-back diodes (to clip the peaks to square waves). A typical circuit for this is shown in Figure Three.

The comparator acts as a 'go-nogo' device. A 1400 Hz signal produces a TTL '1' (+5V) and a 700 Hz signal produces a TTL '0' (0V).

Systems that provide a listing of the Supervisor program (often confusingly called the monitor program, as distinct from a television-type monitor) allow the user to tailor the input/output to his own needs. I've found this invaluable with my system (a SYM-1), as you can learn a lot by 'standing on the shoulders of giants'.

Perhaps at this stage you're thinking, "I don't want to learn electronics – I just want to know how to add bits and pieces to my computer." Unfortunately, you can't have one without the other, and an understanding of the way things happen in terms of voltages and square waves and timing diagrams is vitally important. Any good book on interfacing your microprocessor with external devices will provide the necessary information.

Let us now return to the beginning of this article and talk about the second of the two buses. This second bus is called the data bus, and it is over this bus that data flows both to and from the microprocessor. For this reason, the data bus is termed a 'bi-directional bus'. In addition, the data bus is always a parallel-

transfer bus, and here we had better make the distinction clear.

In serial transmission, the information is sent from the transmitting device bit-by-bit, starting with the least significant bit and ending with the most significant bit. To tell the receiving device when one character stops and another starts, several start and stop bits are added between the transmission of each character.

In its simplest form, serial transmission can be likened to the sending of Morse code, in which a short period of silence is the 'end-of-character' signal. This is also a good example of serial transmission at its simplest. The sender sends, and hopes the receiver is receiving. If the receiver misses some bits, then he sends a message saying "please re-transmit", and the whole message is sent again.

Ready And Waiting

It is for this reason that the serial transmission often has two other lines – a CTS line and an RTS line. The sending device toggles the CTS (clear to send) line, informing the receiving device that a character of data is ready and waiting. When the receiving device is ready to receive its character, it toggles the RTS (request to send) line, telling the originating device to send the character.

For the purist, this is a greatly simplified explanation of serial transmission, but we don't wish to bury the novice in a mass of technical data.

Just one more point about serial transmission, and this is the one that creates the problems. The sending and receiving devices must have closely matched baud rates, as any variation in timing will mean that garbage starts being received, and the transmission breaks down. For this reason, serial transmission at high baud rates (greater than 4800 baud) can be fraught with danger.

As I have mentioned, the transfer of data inside the computer is accomplished by parallel transmission on the data bus. This is where the concept of four-, eight- and 16-bit microprocessors comes about. It refers to the number of bits of data that can be transmitted simultaneously on the data bus.

Using a four-bit data bus, only 2 (to the power of 4) different characters can be represented. This would limit our ability to transmit both letters AND numbers. However, with an eight-bit data bus, one can represent 256 different characters, allowing us to transmit letters, numbers, control codes, graphics characters and still have space for more.

It is the concept of simultaneous transmission that makes parallel transfer such a boon. No need to match baud rates – all the character is sent in one burst – and no need to worry about start or stop bits.

What, then, are the drawbacks of parallel transmission? Simply put, it requires one input/output line for each bit, plus two (or more) control lines. This means a minimum of 10 input/output lines, all dedicated to the one device, against a maximum of five for serial transmission.

There is one other advantage of parallel transmission. Most printers are supplied with a Centronics-type parallel interface installed. Serial interface boards often cost an extra hundred dollars, and this has become a big influence in my life, as I have a wife whose only knowledge of computers is the vast amount of money they consume. ▶

```
0010              .BA $9F00
0020              .OS
0030              .LS
0040  PA1         .DE $A001  ; This is the 8-bit line to the Epson
0050  DDRA1       .DE $A003  ; This controls the direction of data flow
0060  PB1         .DE $A000  ; This is the 2-bit control line to the Epson
0070  DDRB1       .DE $A002  ; This sets up the direction of the control lines
0080  ACCESS      .DE $8B86  ; This unprotects the system RAM
0090  NACCESS     .DE $8B9C  ; This re-protects the system RAM ( on the 6532 )
0100  TOUT        .DE $8AA0  ; This is the routine which sends data to the VDU
0110  OUTVEC      .DE $A664  ; This is the location which holds the location of
0120  ;                        the normal output routine ( i.e. it normally has
0130  ;                        TOUT - $8aa0 stored here ).
0140  INIT        JSR ACCESS
0150              LDA #L,PRINTER  ; This is the new routine to be placed in
0160              STA OUTVEC      ; the output vector location
0170              LDA #H,PRINTER
0180              STA OUTVEC+1
0190              LDA #$FF
0200              STA DDRA1     ;MAKE PORT A THE PRINTER OUTPUT PORT
0210              LDA DDRB1     ;MAKE PORT B THE CONTROL PORT
0220              ORA #$08      ;MAKE BIT 3 THE EPSON STROBE
0230              AND #$DF      ;MAKE BIT 5 THE EPSON BUSY LINE
0240              STA DDRB1
0250              LDA #$11      ;SWITCH ON THE EPSON AS A DEFAULT VALUE
0260              JSR WAIT
0270              JSR NACCESS
0280              RTS
0290  ;
0300  ;
0310  PRINTER     CMP #$2F      ;LOOK FOR A SLASH COMING IN
0320              BEQ SUB       ;AND SUBSTITUTE A SPACE FOR IT
0330              CMP #$3E      ;LOOK FOR THE RAE PROMPT COMING IN
0340              BEQ SUB       ;AND SUBSTITUTE A SPACE FOR IT ALSO
0350              CMP #$30      ;LOOK FOR A ZERO COMING IN
0360              BNE ESCTEST   ;IF NOT ZERO, GO CHECK FOR ESCAPE SEQUENCE
0370              JSR TOUT      ;SEND THE ZERO TO THE KTM-2
0380              LDA #$1B      ;AND SET UP THE EPSON FOR THE INTERNATIONAL CHAR.
                                ; SET - My Epson does not slash the zero, but if
0390              JSR WAIT      ; I substitute the Danish Ø, who can t ll the
0400              LDA #'R       ; difference ?
0410              JSR WAIT
0420              LDA #$04      ;DENMARK IS THE ONE WE WANT
0430              JSR WAIT
0440              LDA #$5C      ;THIS SUBSTITUTES THE DANISH Ø FOR ZERO
0450              JSR WAIT
0460              LDA #$1B      ;RESET TO THE DEFAULT VALUE
0470              JSR WAIT
0480              LDA #'R
0490              JSR WAIT
0500              LDA #$00
0510              JMP WAIT
0520  SUB         PHA
0530              LDA *$C9      ;CHECK FOR THE SLASH OR RAE PROMPT COMING FROM BA
SIC
0540              CMP #$4C
0550              BNE SUB1
0560              PLA
0570              JMP NOT^      ;IT'S BASIC SO SEND TO EPSON
0580  SUB1        PLA
0590              JSR TOUT      ;SEND TO THE KTM-2 REGARDLESS
0600              LDA #$20 BUT SEND A SPACE TO THE EPSON
0610              JMP WAIT
0620  ESCTEST     CMP #$1B      ;IS IT AN ESCAPE SEQUENCE ?
0630              BNE TEST^     ;NO, SO GO CHECK FOR AN RAE CONTROL CODE
0640              JSR WAIT      ;YES, SO SEND TO THE EPSON
0650              LDA #'$
0660              JSR TOUT      ;SEND A TOKEN '$' TO THE KTM-2
0670              RTS
0680  ;
0690  ;
0700  TEST^       CMP #'^       ;CHECK FOR A CONTROL CODE COMING FROM RAE
0710              BNE NOT^      ;NOT A CONTROL CODE
0720              LDA *$C9      ;IS THE CHARACTER COMING FROM BASIC AGAIN ?
0730              CMP #$4C
0740              BEQ PRINT^    ;YES, SO SEND IT
0750              TSX  ;        ;NO FROM RAE
0760              LDA $103,X    ;SO CHECK WHAT IS ON THE RAE CONTROL STACK
0770              CMP #$20      ;IF GREATER THAN 20 IT CAN'T BE A CONTROL CODE
0780              BCS PRINT^    ;SO SEND TO PRINTER
0790              PHA
```

Figure 4. Assembly language listing of a simple interface program.

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```
0800                LDA #$40
0810                STA $103,X
0820                LDA #'^
0830                JSR TOUT
0840                PLA
0850    .TO.M       CMP #$1F      ;CONVERT 'CTRL SHIFT DELETE' TO A CARRIAGE RETURN
0860                BNE .TO.J
0870                LDA #$0D
0880                BPL OK
0890    .TO.J       CMP #$1E      ;CONVERT 'CTRL SHIFT ^' TO A LINE FEED
0900                BNE U.TO.0
0910                LDA #$0A
0920                BPL OK
0930    U.TO.0      CMP #$15      ;CONVERT 'CTRL U' TO 'CTRL @'
0940                BNE V.TO.I
0950                LDA #$00      ;FOR SOME REASON RAE DOESN'T LIKE 'CTRL @'
0960                BEQ OK
0970    V.TO.I      CMP #$16      ;CONVERT 'CTRL V' TO 'CTRL I' -- HORIZONTAL TAB
0980                BNE W.TO.Q
0990                LDA #$09
1000                BPL OK
1010    W.TO.Q      CMP #$17      ;CONVERT 'CTRL W' TO 'CTRL Q' -- SWITCH ON EPSON
1020                BNE OK
1030                LDA #$11
1040    OK          PHA
1050                CLC
1060                ADC #$40 :MAKE IT PRINTABLE FOR RAE
1070                JSR TOUT
1080                PLA
1090                JMP WAIT
1100    PRINT^      LDA #'^
1110    NOT^        JSR TOUT
1120    WAIT        PHA
1130    WAIT1       LDA #$20
1140                AND PB1       ;WAIT FOR BUSY LINE TO GO LOW
1150                BNE WAIT1
1160                PLA  ;        ;RETRIEVE CHARACTER
1170                STA PA1       ;AND SEND TO EPSON
1180                LDA PB1
1190                AND #$F7      ;STROBE EPSON -- CHARACTER AVAILABLE
1200                STA PB1
1210                ORA #$08      ;SET STROBE HIGH AGAIN
1220                STA PB1
1230                RTS
1240                .BY $FF
1250    PROFF       JSR ACCESS    ;SWITCH OFF THE PRINTER AND RESET THE SYSTEM TO
1260                LDA #L.TOUT   ;ITS NORMAL DEFAULT SETTINGS.
1270                STA OUTVEC
1280                LDA #H.TOUT
1290                STA OUTVEC+1
1300                LDA DDRB1
1310                AND #$D7
1320                STA DDRB1
1330                JSR NACCESS
1340                RTS
1350                .EN
1360    ;
```

Notes to Figure 4:

1. Lines 40 to 110 set up the eight-bit data line and the two-bit control line for the 'busy' signal and the 'strobe' signal.
2. Lines 140 to 280 change the default value of the output vector (which normally points to the CRT output routine — called TOUT) to now point to the printer output location. The printer is also switched on by this section.
3. Lines 310 to 1110 can be omitted — they are both system and printer specific.
4. Line 1120 saves the characters on the stack, and then loops through lines 1130 to 1150, waiting for the Epson busy line to become a TTL low.
5. Line 1160 retrieves the character, line 1170 sends it out to the Epson, and lines 1180 to 1200 tell the Epson that the character is available.
6. Lines 1250 to 1340 do exactly the opposite of lines 140 to 280.

Half-Duplex Keyboard

Before continuing with further discussion of interfacing, let's take a look at how a character is sent from your computer keyboard to the printer.

In the normal course of operation, you hit, for example, the character capital H on your QWERTY keyboard. If your keyboard is what is known as a half-duplex keyboard, that character will appear immediately on your VDU. If, however, your keyboard is a full-duplex keyboard, the character is first sent to the central processing unit, and then echoed back to your terminal.

Regardless of which method is used, we have to intercept the character with a special 'printer driver' routine, which will send the character to both the central processing unit and the input/output chip that we have attached to our printer. On most store bought systems this can be done simply by using an LPRINT command, which is simply a routine that performs the desired function.

If, however, such a command does not exist, or there is no provision on your computer for a printer output, then you will have to write the driver program to handle the character interception, and subsequently send it to both the central processing unit and the printer. Whilst this is not a too-formidable task, the routine largely depends on the micro being used, and the printer being attached. For purpose of illustration only, I've included an Assembly language listing of a simple interface between my SYM-1 and an Epson MX-100 in Figure Four.

In the next article, I'll talk about ROM and RAM in a bit more detail, and how you can effectively increase the memory capacity of a computer. I'll also discuss the mysteries of the 6522 VIA output chip. □

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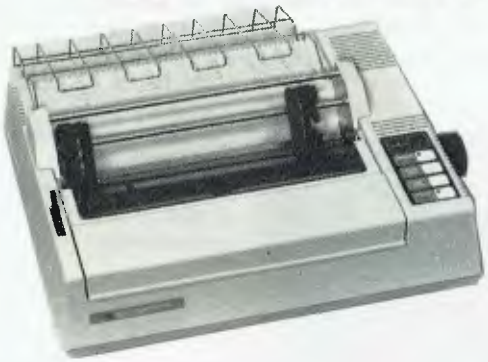


Here is an unbeatable opportunity to purchase a top quality printer from a well known and respected manufacturer, Texas Instruments, at a saving of over 30% on their normal list price.

TI 850 PRINTER

$760 exc. tax
$912 inc. tax

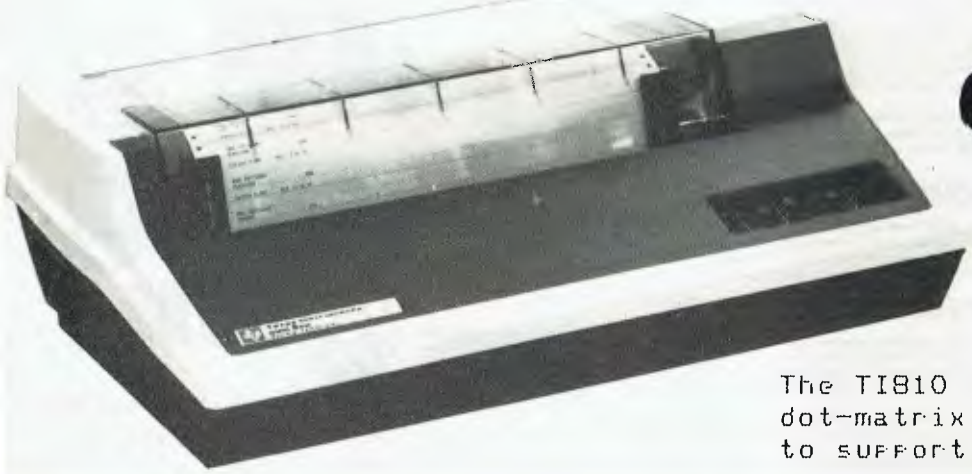
Normal list price on this printer is $995 exc. tax; save $235!

SPECIFICATIONS TI 850 PRINTER

TI 850 SPECIFICATIONS

POWER REQUIREMENTS	
Voltage	90-132 Vac, 47 63 Hz, single phase or 187-264 Vac, 47 63 Hz single phase
Power	100 W maximum
PHYSICAL DIMENSIONS	
Size	412 mm (16.2) wide 220 mm (13.0) deep 127 mm (5.0") high
Weight	6 8 kg (15lb) excluding options and accessories
CHARACTER SETS	
Type	Full US ASCII and 7 international
INDICATORS	
Light	Power, on-line pitch SFL
DATA	
Parallel Interface	
Line levels	0 or +5 Vdc
Characters per second	1000 cps maximum
Line control	Strobe acknowledge
Serial Interface	
Specification	EIA RS-232-C standard subset
Line levels	12 or +12 Vdc
Type code	ASCII and similar international codes
Bits per second	200, 300, 600, 1200, 2400, 4800 9600
Receive buffer	256 characters, expandable to 4000 characters
Line control	Printer ready busy
PRINTER	
Method	Wire-matrix impact
Speed	Print 150 cps
Pattern	9 x 9 dot matrix (standard print) 15 x 9 dot matrix (enhanced print)
Characters per inch	10 cpi and 16⅔ cpi (standard) 5 cpi and 8⅓ cpi (double-wide)
Characters per line	80 characters at 10 cpi (standard), 132 characters at 16⅔ cpi
Line length	Full line at 10 cpi or 16⅔ cpi requires 203 mm (8")
Lines per inch	6 lpi and 8 lpi
Paper drives	Friction-roller or tractor
Paper width	76 mm to 254 mm (3 to 10 in)
PAPER	
Type	Sheet, roll or fanfold (single or multipart)
Width	254 mm (10in) maximum
Roll	127 mm (5.0 in), maximum diameter
Thickness	Single part 0.254 mm (0.01 in) Multipart, 0.34 mm (0.014 in) maximum for original plus two copies (No cards permitted except on last copy)

TI 810 PRINTER



$1410 exc. tax
$1692 inc. tax

Normal list price on this printer is $1890 exc. tax; save $480!

The TI810 is a fast, draft-quality dot-matrix printer which is built to support continuous throughput.

SPECIFICATIONS TI 810 PRINTER

TI 810 PRINTER

PRINTER	
Technique	Seven-wire matrix impact
Character matrix	9 x 7 (9 wide, 7 high) dot matrix
Character set	64-character limited ASCII
Characters per inch	10
Characters per line	132 maximum
Lines per inch	6 or 8 (operator- or software-selectable)
THROUGHPUT	
Print speed	150 characters per second
Lines per minute	64 at 132 characters per line, and up to 450 at 10 characters per line
Line feed	33 milliseconds
Paper slew	178 mm per second (6.67 inches per second)
PAPER	
Paper width	Adjustable from 76 to 381 mm (3 to 15 inches)
Paper loading	Rear or bottom feed
Number of copies	One original and five copies
CONTROL SYSTEM	
Electronics	8080 microprocessor system
Printing method	Bidirectional
Buffer (FIFO)	256 characters
Horizontal tabs	Software Programmable
Vertical format control	Software and operator programmable
Self-test	Prints ASCII characters in a rotating pattern (barberpole)
Bell	Pulsing audible tone
COMMUNICATIONS	
Interface	Serial (EIA RS-232-C)
Baud rates	110, 150, 300, 1200, 2400, 4800, 9600
Parity	ODD, EVEN or ignore
INPUT POWER	
ac voltage	100, 120, 220 or 240 Vac (−10% to +15%)
Frequency	47 to 63 hertz
Watts	200
Power fuse	100 or 120 Vac range, 5 A, 250 V fuse 220 or 240 Vac range, 2.5 A, 250 V fuse
PHYSICAL DIMENSIONS	
Weight	25 kg (55 pounds)
Height	203 mm (8 inches)
Width	654 mm (25.75 inches)
Depth	508 mm (20 inches)

OPTIONS

Serial EIA cable for 810 printer: $50 exc. tax, $60 inc. tax.
Serial cable for 850 printer: $55 exc. tax, $66 inc. tax.

4K buffer for 850 printer: $100 exc. tax, $120 inc. tax.
All items carry normal warranty.

OFFER*

* until you've read it through

TOP QUALITY TEXAS INSTRUMENTS PRINTERS

TI850 PRINTER

The Model 850 printer is a reliable, versatile dot matrix impact printer featuring 150 cps bi-directional operation and 9 x 9 or 15 x 9 dot matrix characters with true descenders. Mosaic graphics are possible with a squared-off pattern six dots wide by 12 dots high. It is also capable of raster graphics.

It comes with a serial/parallel interface as standard; all you do is change the cable. There is a 256-character buffer inside and a 400-character buffer option is offered, too. The 850 can handle single sheets of paper or fanfold paper up to 254 mm (10") wide and roll paper up to 127 mm (5") in diameter. A comprehensive, copiously illustrated, 108-page manual is supplied with the printer.

This is an example of STANDARD print made by the Model 850 Printer.

This is an example of ENHANCED print made by the Model 850 Printer.

This is an example EMPHASIZED print made by the Model 850 Printer.

This is an example of COMPRESSED print made by the Model 850 Printer.

The Model 850 Printer made this example of DOUBLE-WIDE print.

TI810 PRINTER

The Texas Instruments **Omni 800** Model 810 printer is a receive-only, forms-programmable impact printer. It features a microprocessor system which controls all character recognition, printing and paper movement. Basic operating, data processing and self-test routines for the microprocessor system are stored in ROM. Random-access memory stores vertical format control routines, which may be locally programmed by the operator or remotely programmed through the communications line.

A single seven-dot-column printhead produces the 9 x 7 dot matrix for character generation. Printing is bi-directional at the rate of 150 characters per second. A full 132-character line is printed in less than one second.

The standard print format is 10 characters per inch (cpi) horizontally and six or eight lines per inch (lpi) vertically. The printer produces one original and up to five copies using sprocket-fed paper in widths from 76.2 to 381 mm (3" to 15").

A detailed, comprehensive, A4-format, 76-page manual is included.

Serial/parallel interface is standard; all you do is change the cable.

There's nothing flash about the Texas Instruments 810 printer — but it's an ideal printer. It prints quickly and cleanly, and it's as close to unbreakable as we've seen. We run three of them in this office — one has been on-line for more than a year without missing a beat. It literally never gets switched off, and runs up to 24 hours a day, all the time.

When we want to move cables in the ceiling, we stand on the printer to get to them! Most printers these days would collapse as soon as you even thought of doing such a thing.

The TI810 is recognised throughout the industry as a reliable, fast workhorse. It's claimed to run at 150 characters a second, and it comes closer to its rating than anything else we've tested. On a solid-text printing test that shows 80 cps machines are actually running at around 34 cps, the 810 comes up just under 130. That's fast.

Its dot matrix typeface is obviously draft quality, without full descenders, but it is clear and readable. If speed and real bullet-proof reliability are what you need, this is the machine.

Normal retail price is around $2200 before tax, and it's good value even at that price.

This is a sample of the dot-matrix print quality of the high-speed Texas Instruments TI810.

HOW TO ORDER YOUR TI PRINTER

Fill out the coupon here and enclose a cheque, bank cheque or money order for the amount required made out to **PACESETTER SYSTEMS PTY LTD.**

If you are not paying sales tax, please quote you sales tax number on the coupon, where indicated, or for schools, colleges or other educational institutions, enclose a sales tax declaration on your letterhead.

Delivery will be by freight to anywhere in Australia, fully insured. Shipments will be made ex-stock, but to cover unforeseen delays, please allow up to 4-6 weeks for delivery. This offer is made by Pacesetter Systems (a division of VSI Electronics Pty Ltd, incorporated in S.A.), and Your Computer is acting as a clearing house for orders. All orders must be via the coupon here, or a photostat thereof if you don't wish to cut the magazine.

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microbee series 2 'EDUCATOR'

Specifications:

PROCESSOR: Z80A running at 3.375 MHZ

KEYBOARD: 60 key FULL SIZED QWERTY layout with full travel.

MEMORY: 44K comprising of 16K user RAM (expandable on-board to 32K), 20K ROM software, 4K character ROM, 4K graphics and screen memory.

DISPLAY: Direct video to external monitor or modified TV. 80 by 24 and 64 by 16 character display modes, high resolution PCG graphics to 512 by 256 pixels. Upper and lower case with full programmability at any screen location.

SOFTWARE: MICROWORLD 16K BASIC V5.22 in ROM, MICROWORLD Z80 machine code monitor, built-in diagnostics, NETWORKING with programmable baud rates from 110 to 4800 Baud, 7,8 bit formats, half, full duplex transmission and complete file transfer using the 'HOBBY' standard Christensen protocol.

INPUT/OUTPUT: Programmable 8 bit input/output parallel port, programmable RS232 port, cassette interface, direct video, 50 way Z80 expansion bus.

microbee Series 2 EDUCATOR

The **microbee Series 2** was specifically designed to serve the needs of the EDUCATION MARKET. Let's face it, the primary non-business use for most personal microcomputers is to increase our learning capabilities either about computers (computer awareness) or about life itself. **microbee Series 2** has now been officially approved by Education Departments in NSW, WA and Queensland and is being carefully considered in virtually all other states and by the National Schools Commission at the time this magazine was going to press. Over 5,000 **microbees** are now in constant use in schools, universities and technical colleges throughout Australia and New Zealand and the number is growing daily.

A large and increasing body of highly creative software has now been written for the **microbee** by students, teachers and professional programmers. We are aware of up to 6 new programs a day so you are assured of long term support.

The **microbee Educator** uses BATTERY BACKED NON-VOLATILE CMOS RAM so your programs are saved in the **microbee Series 2** after the power is switched off. Students can bring the **microbee Series 2 Educator** home from school to complete assignments ready for class the next day. With the optional BEEMODEM you can use your **microbee Series 2 Educator** to talk to other computers or information networks.

For school classroom use BEENET 1 is available to connect up to 16 or even more **microbees** on the same classroom network so that the teacher is able to co-ordinate the class with maximum efficiency.

microbee Series 2 EDUCATOR **$449**

Recommended Options:

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WITH DUAL 400K DISK DRIVE $1795

microbee series 2 'EXPERIMENTER'

Specifications:

PROCESSOR: Z80A running at 3.375 MHZ.

KEYBOARD: 60 key FULL SIZED QWERTY layout with full travel.

MEMORY: 36K comprising of 8K user RAM (expandable on-board to 16K), 20K ROM software, 4K character ROM, 4K graphics and screen memory.

DISPLAY: Direct video to external monitor or modified TV. 80 by 24 and 64 by 16 character display modes, high resolution PCG graphics to 512 by 256 pixels. Upper and lower case with full programmability at any screen location.

SOFTWARE: MICROWORLD 16K BASIC V5.22 in ROM, MICROWORLD Z80 machine code monitor, built-in diagnostics, NETWORKING with programmable baud rates from 110 to 4800 Baud, 7,8 bit formats, half, full duplex transmission and complete file transfer using the 'HOBBY' standard Christensen protocol.

INPUT/OUTPUT: Programmable 8 bit input/output parallel port, programmable RS232 port, cassette interface, direct video, 50 way Z80 expansion bus.

microbee Series 2 EXPERIMENTER

By popular request, the low cost **microbee Series 2 Experimenter** has been designed for those who are starting out in the fascinating world of computers or those who want to share the fascination of exploring the exciting developments in the fast moving MICRO WORLD.

Demand for projects using the **microbee** is so great that 'Electronics Today' are now planning to run a **microbee** project every month during 1984. So far ETI has described the light pen, EPROM programmer, a radio TTY printer, the World's first home facsimile receiver and ROM expander board for the **microbee**. Virtually every local computer magazine has run reviews and/or columns devoted entirely to the **microbee**. If you want to be part of the MICRO-COMPUTER GENERATION in 1984 then **microbee Series 2 Experimenter** is the ideal starting point.

microbee Series 2 EXPERIMENTER $399

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The Co-op has not only modernized its systems with its AWA Reality Computer System, it is now modernizing its stock, said John Ruwolt, Computer-Ware Controller. In future the Co-op will be the number one supplier of computer books in NSW, and a major supplier of educational software in the tertiary arena.

AVAILABILITY: From now on, it will be very easy for microcomputer enthusiasts to obtain the title they want, **when they want it**. Stock lists by subject will be freely available from every branch, and a free mailing list scheme will ensure every interested member receives regular up-to-date information. Branches will have up-to-date information on title availability.

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NEW INTERESTS: The Co-op will continue to exhibit computer books at seminars, conferences and computer exhibitions, as well as actively tendering for the supply of books and related software to training schools, corporations, and other educational groups, including user groups. They welcome your booking for 1984.

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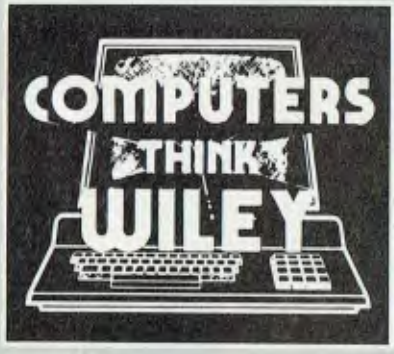

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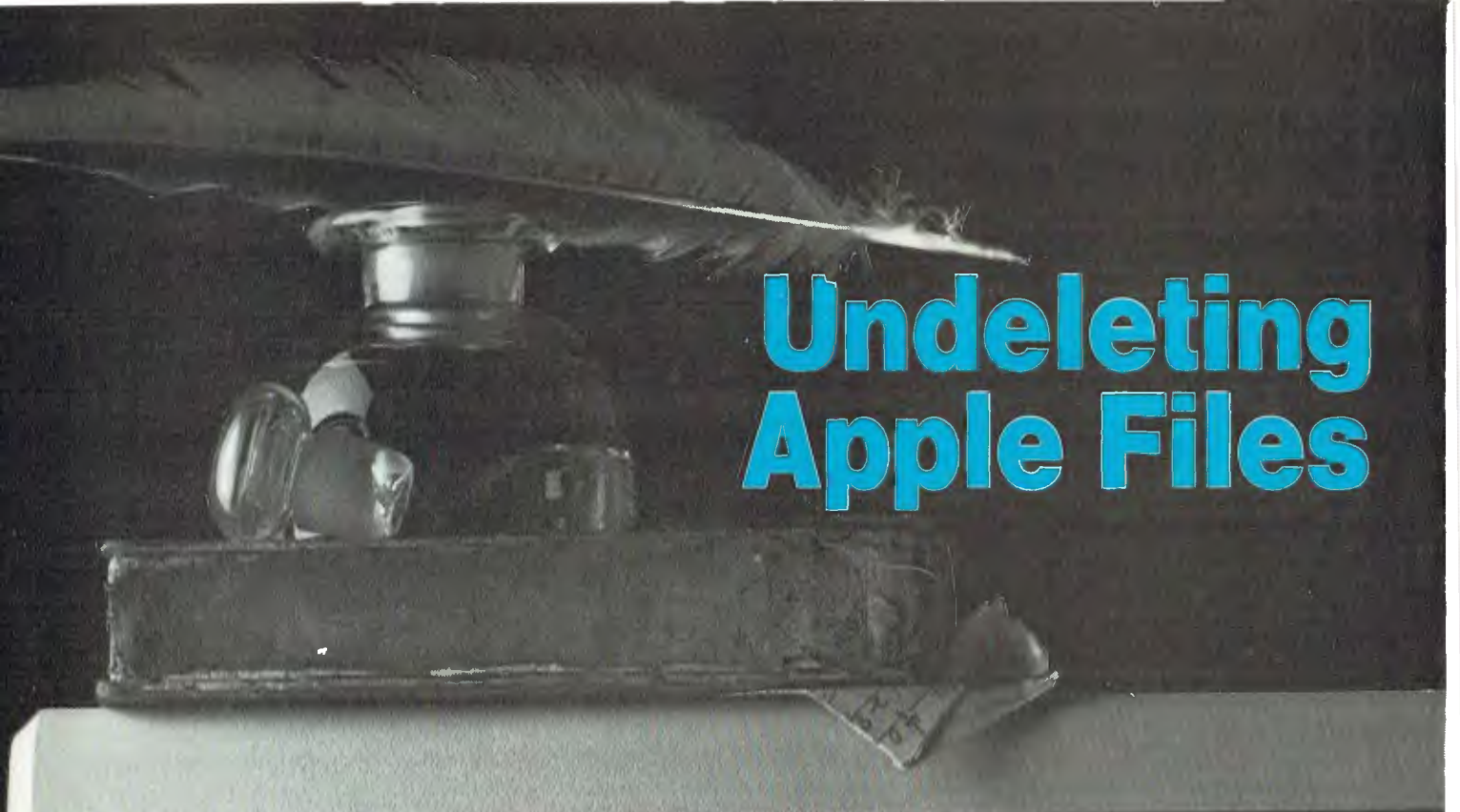

Undeleting Apple Files

Mem:56565 Len 3456 Pos: 386 Tab: 186 File: d1/applewriters

APPLE WRITERS

by

Dale Archibald

Computerized text editing with personal computers is helping many professional writers deal with the part of their job that's drudgery, leaving them more time for creative thinking.

French detective writer Georges Simenon once warned aspiring authors that "writing is not a profession, but a vocation of unhappiness."

Few professional writers would entirely disagree. Generating perfect copy is often a ponderous process. To produce a story, most writers start with the germ of an idea, build it into a concept, then work and rework that concept into a total book or article. Even then, the best writers are rarely satisfied, turning phrases again and again until they've produced a polished

What's your worst computing nightmare? Ask any hack and the answer's likely to be "deleting a file by accident". Keith Jeeves brings the welcome news that, for Apple users at least, the mistake is reversible.

IT SHOULD be quite difficult to accidentally delete a wanted file from an Apple disk. After all, you have all the files locked, and to remove a file you have to unlock a named file and then delete it. Somewhere along the line a warning bell should ring in the back of the mind to stop you before it is too late.

Back to the real world ... it's late at night and you have about five development versions of a new program, none of them locked and all called something ver1, ver2, and so on. Before calling it quits you want to delete the obsolete files and tidy up the disk a bit. Unfortunately, you get it wrong and the only working and yet undocumented file disappears. I've done it (more than once) and it isn't a pleasant feeling.

Be informed that:

a) Deleted files are not gone forever.

b) It is quite easy to undelete a deleted file.

c) There follows a program to automatically undelete all deleted files on a disk without any user input other than running the program.

Inside Apple DOS

There seems to be plenty of information available on the disk operating system for the Apple (DOS), most of it little snippets in magazines, 'Call Apples' and so on, and all of it fairly heavy reading and hard to tie together. The DOS manual has a lot of good background but is not intended as a technical tutorial and leaves most people skipping the last chapters.

There is, however, an excellent book called 'Beneath Apple DOS' which seems to be readily available. The book takes apart the disk operating system and explains in minute detail its design and operation. Make no mistake, the book is heavy going because the Apple DOS is a highly sophisticated piece of software and no amount of 'see John reconstruct a smashed VTOC, see Mary use the file manager' type of approach is going to make it less technical and easier to understand.

The purpose of this article is to demonstrate how to undelete files that have been deleted. The undeleting is performed both manually and by use of a machine language program, both techniques making use of the program ZAP described in the book 'Beneath Apple DOS'. It is not the intention of this article to describe in detail how files are catalogued or how the DOS works; the book does that.

It is also important to stress that working with disks and interfering with the operating system can be hazardous, and experiments and trial runs should be carried out on disks set aside for the purpose. Only when you are confident that techniques and programs described here are working correctly should you play with important stuff. Generally, if you make a mistake at the user level, you can recover intact. If you make a mistake at track/sector level you can't.

File Cataloguing

Briefly, when a file is SAVEd, a spare sector somewhere on the disk is found and used to hold a list of the track/sector locations of each 256-byte lump of data in the file (you know of course that there are 35 tracks with 16 sectors each – for DOS 3.3 – and each sector holds 256 bytes, giving a theoretical capacity of 143,360 bytes of storage? You should also know that some of this space is taken up with storing the DOS itself, and the whole of track 17 is used for the management of the disk space).

When all the bytes are neatly stored away and the track/sector list is complete, the DOS goes to track 17 and makes an entry of the location of the track/sector list, the type of file, whether the file is locked or not, the name of the file and the number of sectors making up the file (including the track/sector list sector, which is why the minimum-sized file is two sectors long).

When you give the CATALOG command, you are accessing this track and displaying most of the information held on it. When you RUN a file, the DOS finds the catalogue entry and goes to the nominated track sector list to load the 256-byte blocks of data.

The first two entries in the catalogue are the track and sector of the track/sector list for the file. When a file is deleted, the first entry (the track location) is moved to the end of the file name entry and the first entry is made FF. To undelete a file, we simply identify which catalogue entries begin with FF, recover the correct data and make the last file name character a 'space', which it probably was before and if it wasn't it's not important because having got the file back, you can RENAME it in the usual way.

UNDELETED files *must* be copied to another disk, the first file deleted and the copy resaved to the first disk. This is because the first sector of track 17 holds a table of contents of the disk which is updated when files are deleted. UNDELETING a file by the method described will not alter the table of contents and the disk management will be upset. DELETEing and reSAVEing will keep everything straight.

Use Of The Zap Program

The program ZAP in 'Beneath Apple DOS' is a simple program to read a nominated sector from a nominated track and store it in 256 bytes of memory for investigation or modification. ZAP also allows you to write the block of memory back to the disk. To UNDELETE a file, you do the following:

a) Enter the monitor (CALL-151)

b) BLOAD ZAP

c) Set the track pointer ($02) to 11.

d) Set the sector pointer ($03) to 0F.

e) Set the read/write pointer ($04) to 01 (read).

f) Run ZAP (900G).

g) Examine the first byte of each of the seven files held by the sector by inspecting the following locations in the file buffer where the nominated sector is stored:

1) 080B
2) 082E
3) 0851
4) 0874
5) 0897
6) 08BA
7) 08DD

Any byte showing FF is a deleted file and can be identified by reading the ASCII file name which begins three bytes along the entry, that is at 080E, 0831, 0854, 0877, 089A, 08BD and 08E0. (The ASCII equivalents for the bytes found appear on page 15 of the 'Apple Reference Manual').

If the wanted file is not at any of the seven file locations for the sector, the ZAP sector pointer should be set to 0E and the program run again. The next seven files can be investigated, and so on for all sectors down to the end of 01, which is the last of the CATALOG sectors; 00 is the Table of Contents sector.

When the file is found, the last entry of the CATALOG name should be inspected. The byte found should be placed back in its correct position at the start of the file (in the position indicated in (g) above). The last entry of the file name will be found at 082B, 084E, 0871, 0894, 08B7, 08DA, 08FD in the ZAP file buffer. When the byte has been copied to the start of the file, change the last byte to A0 (space). If you don't, you will end up with a character at the end of the file name which you may not be able to type from the keyboard, making subsequent copying difficult.

When the corrections have been made, set the read/write pointer ($04) to 02 and run ZAP (900G). This will save the sector back to the disk, and you will find that on a CATALOG command the lost file reappears. LOAD it and SAVE it on another disk, DELETE it on the first ▶

disk and copy it back again. When you have searched through a number of file name entries using this method, you will see why it is good practice to keep your disk file count low.

This is a good time to point out that if a file SAVE command has been given since a file was DELETEd, part of the deleted file may have been overwritten. If you accidentally DELETE a file, it is wise to recover it immediately, and in any case do not SAVE any data to the disk until you have restored the wanted file.

As the operation is one of inspecting numbers, comparing with FF and moving bytes when a match is found, the computer can do the work. The program below will check each of the CATALOG sectors and UNDELETE every DELETEd file it finds in less than a second.

The ZAP program was slightly modified to prevent a partial screen dump when the sector is read. A dump of the new ZAP is given below. In addition, a machine language program ZAP USER was written, which resides at $1000 and performs all the pointer management required to cycle ZAP through the CATALOG sectors on track 17. As the sectors are brought into the buffer, ZAP USER inspects the file entries to identify and UNDELETE every DELETEd file it finds.

A short Applesoft file UNDELETER loads ZAP and runs ZAP USER if the three files are on the same disk as the deleted files. Otherwise, enter the monitor (call-151), BLOAD ZAP, BLOAD ZAP USER and run ZAP USER by typing 1000G. When it has completed its task, the program places you gently back in the language you were using before you entered the monitor.

Use Different Names

You should use the automatic UNDELETER with care, especially if along the way you have created and deleted files with a common name. It is a good idea to make a note of the contents of the disk before the UNDELETER is run because you may be surprised by the amount of rubbish that appears from beyond the grave and will have to be got rid of soon. To save the modified ZAP program, enter the monitor and type it in, check it and BSAVE ZAP,A$900,L$60

To save the ZAP USER program BSAVE ZAP USER,A$1000,L$300.

Note that ZAP USER is not a particularly efficiently coded program and has a few non-contiguous subroutines (that means they are not all touching), but then short simple programs like this don't need to be that elegant or efficient, they just have to work reliably.

As a parting gift, why not make use of the ZAP program to modify catalogue entries? You can have inverse or flashing file names, although you won't be able to access them direct from the keyboard; use an auto catalogue and run utility, or write a BASIC program to change the ASCII keyboard entry and run the program under program control.

Read and attempt to understand 'Beneath Apple DOS' and use ZAP, DUMP and so on to perform practical experiments on your disks (remember we use a separate disk for experiments, don't we). A working knowledge of DOS adds a new dimension to using the Apple and allows new techniques to be developed and understood, such as file copy protection, speeding up file access times and other magic previously only hinted at in the US magazines.

Main Program

The Program:

a) Sets the temporary sector pointer byte to $0F.

b) Sets the ZAP sector pointer to the value in the sector pointer.

c) Sets the ZAP track pointer to 11 and the ZAP read/write pointer to 01 (read).

d) Runs ZAP.

e) Checks each of the seven files in sector 0F for the DELETEd file identifier.

f) Goes to the subroutine jump table at $1180 for a vector address to the main data change subroutine.

g) Decrements the sector pointer by one byte and checks for the end of the track.

h) If there are more sectors to go, the program jumps to (b). If not, exit the monitor and return to the user language.

```
1000- A9 0F 8D 00 13 A9 11 8D
1008- 02 00 AD 00 13 8D 03 00
1010- A9 01 8D 04 00 20 00 09
1018- AD 0B 08 C9 FF F0 61 AD
1020- 2E 08 C9 FF F0 60 AD 51
1028- 08 C9 FF F0 5F AD 74 08
1030- C9 FF F0 5E AD 97 08 C9
1038- FF F0 5D AD BA 08 C9 FF
1040- F0 5C AD DD 08 C9 FF F0
1048- 5B 4C 53 10 02 02 02 02
1050- 02 00 02 CE 00 13 AD 00
1058- 13 C9 01 D0 03 4C D0 03
1060- 4C 05 10
*
```

```
1080- 20 00 11 4C 1F 10 20 40
1088- 11 4C 26 10 20 80 11 4C
1090- 2D 10 20 C0 11 4C 34 10
1098- 20 00 12 4C 3B 10 20 40
10A0- 12 4C 42 10 20 80 12 4C
10A8- 49 10
*
```

Main Program Change Subroutines

The Program:

a) Takes the file track/sector list pointer from the last byte of the file name.

b) Puts it back to the first byte of the file entry.

c) Stores a space ($A0) at the last byte of the file name.

d) Sets the ZAP read/write pointer to $02 (write).

e) Runs ZAP and returns to the main program.

```
1100- AD 2B 08 8D 0B 08 A9 A0
1108- 8D 2B 08 A9 02 8D 04 00
1110- 20 00 09 60
*
```

```
1140- AD 4E 08 8D 2E 08 A9 A0
1148- 8D 4E 08 A9 02 8D 04 00
1150- 20 00 09 60
*
```

```
1180- AD 71 08 8D 51 08 A9 A0
1188- 8D 71 08 A9 02 8D 04 00
1190- 20 00 09 60
*
```

```
11C0- AD 94 08 8D 74 08 A9 A0
11C8- 8D 94 08 A9 02 8D 04 00
11D0- 20 00 09 60
*
```

```
1200- AD B7 08 8D 97 08 A9 A0
1208- 8D B7 08 A9 02 8D 04 00
1210- 20 00 09 60
*
```

```
1240- AD DA 08 8D BA 08 A9 A0
1248- 8D DA 08 A9 02 8D 04 00
1250- 20 00 09 60
*
```

```
1280- AD FD 08 8D DD 08 A9 A0
1288- 8D FD 08 A9 02 8D 04 00
1290- 20 00 09 60
*
```

Modified ZAP

The modification prevents a partial screen dump of the ZAP buffer store at

the end of a Read or Write sequence.

The modified ZAP is intended to run in conjunction with the main program ZAP USER, but can be used as a stand-alone program to investigate any sector on an Apple disk.

For further details, refer to Page A-8 of 'Beneath Apple DOS' by Don Worth and Pieter Lechner.

❑

```
0900- 20 E3 03 84 00 85 01 A5
0908- 02 A0 04 91 00 A5 03 C9
0910- 10 90 04 A9 00 85 03 A0
0918- 05 91 00 A0 08 A9 00 91
0920- 00 C8 A9 08 91 00 A5 04
0928- A0 0C 91 00 A9 00 A0 03
0930- 91 00 20 E3 03 20 D9 03
0938- A9 00 85 48 90 1B A9 87
0940- 20 ED FD A9 D2 20 ED FD
0948- A9 C3 20 ED FD A9 BD 20
0950- ED FD A0 0D B1 00 20 DA
0958- FD 60
*
```

No longer need your 5 am mistakes be disasters; if you accidentally delete an Apple file now, you can use this article to help you retrieve your data.

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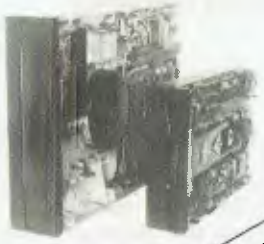

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your computer text file

Copyright

MY ENQUIRY is one that I feel may be troubling user groups around Australia, and it concerns copyright.

I own a MicroBee. If I modify a program to run on the MicroBee and distribute copies through a User Group newsletter:

a. Do I breach copyright by not acknowledging the original source of the idea/program; or

b. Would it be preferable to acknowledge the source, for example:

Creative Computing
'Program' as modified for the Microbee by F. Bloggs.

Your advice in this matter would be appreciated.

J F JOHNSON
Gulliver, Qld.

The legal position about this question is uncertain, but (b) probably covers the situation in the safest and fairest way.

Personal User Group In Townsville

IT WOULD be appreciated if you could bring to the attention of your readers the formation of a personal computer user group in Townsville – the Townsville MicroBee User Group (T-MUG).

T-MUG meets at 7 pm on the second Monday of the month, with another 'user' meeting held later in the month. Meetings are held at:

Town and Country Computers
CTL Centre
Anne Street
Aitkenvale

Anyone interested is invited to contact our President, Chris Hayes, a/h (077) 79 6065, or our Secretary, John Johnson, a/h (077) 79 5628.

Your assistance is appreciated.

J F JOHNSON
Aitkenvale, Qld.

Wherefore Art Thou, ColourBee?

AFTER SOME 15 months of agonising over which personal computer to buy, I finally opted for a 32K MicroBee fitted with a colour card. This decision was based on the excellent reviews given to the Colour MicroBee in computer journals in early 1983.

I now thoroughly regret having made that decision, for it appears that Applied Technology was actively promoting a colour system which wasn't completely proven.

At the time of placing the order I was advised that delivery would be in about five weeks. Now, some five months and many phone calls later, I am still advised that delivery will be in five weeks.

Having reached the limit of my patience I have cancelled that order.

I have since discovered that mine is not an isolated instance and that others have incurred similar inordinate delays in delivery.

Perhaps others could benefit from my experience. I would advise anyone considering the purchase of a ColourBee to be prepared to be supremely patient or to look elsewhere for a colour computer.

I would advise Applied Technology to develop a more responsible attitude to potential customers. I feel it is misleading for a manufacturer to advertise its products far in advance of its capacity to supply them.

Management at Applied Technology speaks ambitiously of colour raster graphics, slimline drives and networking. I would urge that these capabilities be thoroughly tested and proven in order to avoid precipitous advertising and promotion.

Any customer who has paid a deposit to secure an order is likely to become irate if required to wait up to six months for delivery. Enough irate customers could create a market backlash sufficient to sour Applied Technology's initial successes.

M GRIFFIN
Moe, Vic.

Price Crash In Australia?

HAVING JUST arrived back from the USA, I am appalled at what appears to be artificially high prices for computers in Australia. The industry in the USA is in trouble, and prices have tumbled; for example, in California the Commodore 64 can be purchased anywhere for less than US$200. (The actual list price of a 64 in the US is $599, and $199 for a VIC-20).

As the price crash will come to Australia (as it did in the metal detector business with manufacturers importing direct and bypassing the authorised distributors and slashing prices), it is about time responsible magazines like *Your Computer* made people aware of what is happening overseas.

People paying, for example, around the list price of AUS$699 for a Commodore 64 or around AUS$290 for a VIC-20 are going to be left with a bad taste in their mouths when inevitably the prices in Australia tumble, plunging the industry and personal computers into disrepute.

P A LYNCH
Eaglemont, Vic.

This being a frequent complaint about the difference in prices between here and the USA, perhaps a computer supplier would like to present the other side of the argument – assuming there is one?

Commendable Series

I FEEL I must write to commend Les Bell on the informative series 'Getting dBest from dBase'.

The documentation supplied for dBase must be the worst ever, and I have learnt more from the parts so far published than from many fruitless searchings through the dBase manual.

D W BOND
Belmore, NSW

Free Listing Of Peach Software

MR PHILLIP A. STEEN'S contribution in 'Text File', March 1983 issue, indicated that there are many people like him who have an interest in the Peach computer and development software for it, or have found solutions to problems many others are still struggling with.

Having recently been appointed distributor for Hitachi microcomputers, which include in their range the MB-6890 – fondly called the 'Peach' – and the MB-16000 (16-bit), we feel that we may help all those interested by compiling, free of charge, a list of all available software and making it generally available. To this end we would be happy to receive, from any source, software information in the following format:

1. Title
2. Synopsis
3. Author
4. Source
5. Price (optionally)

Out there are the fruits of many hours of joy and frustration and they should not be allowed, in the words of Thomas Gray, "to lose its fragrance in the desert air and then is heard no more". Serious or trivial, we would like it recorded and available for passing on.

PATRICK CHONG
North Sydney, NSW

Which Computer?

IT IS my intention to purchase a home computer soon. As I have only a very elementary knowledge of computers and programming, I would appreciate any advice on how and what to purchase. My idea is to build up a system progressively, including disk drive and a printer. Colleagues at work have a VIC-20, Apple II and a Tandy III – and all of them claim their system is the better one.

I still do not have a clear idea what the computer will be ultimately used for, but as I am a maintenance engineer with a medium-sized mining company I am interested in developing a planned maintenance system for use with the computer.

I would be grateful for any assistance you or your readers may be able to provide.

R. N. OLIVER
Karratha, WA

As we tell people regularly in these pages, we cannot make that sort of choice for

you. It is simply not possible for us to make an accurate assessment of your needs from the contents of a letter – it's more like a three-day consulting job, and if you saw our consulting fees . . .

We publish the magazine to provide readers like yourself with (among other things) the information necessary to make the decision. Read our reviews, new product information and comparisons, and you should be in a position to make an informed choice.

Computerised College

IN YOUR news section you recently mentioned Australia's largest installation of computers (for a school). However, this record was broken earlier this year when Aquinas College, Southport, installed 32 Hitachi Peaches.

Each has its own 13 cm disk drive and colour monitor, while the two teachers' computers have double disk drives. They are kept in a large, air-conditioned room that is also used to teach in.

With so many computers each student has the sole use of one during the lesson, giving a far greater experience of programming than with the pair of Apple IIs we used to use.

Through this enormous cash outlay, funded solely by the parents and the parish, we all feel that we students of Aquinas will have a much better chance in this era of computer technology.

DARCY HORROCKS
Miami Keys, QLD

What About Atari?

WE HAVE NOTICED in the current issue of your Popular Systems columns that there is no mention of the Atari computer systems. We have also noticed the omission of Atari articles in many previous issues.

We feel that since you claim to be featuring 'popular' systems, the Atari should be included, as it is a very popular and widely sold system.

We specialise in Atari systems, but our customers are hardly likely to buy your magazine as it does not have any relevance for them and their computers.

Could you please tell us why Atari articles are omitted and if there is anything we can do to assist in this situation?

J. PICKERING
Annerley, QLD

It seems Atari users are either so happy using their machines they are too busy to write about them, or they think so little of them they don't bother!

We rely heavily on users to provide worthwhile material on their machines; while we receive a wealth of material for most popular systems, we virtually never hear from an Atari user. Our pages are open to anyone who has an interesting story to tell . . .

What Price A Computer?

THE PRICE OF computers in Australia seems to me to be an enigma – an example should explain what I mean.

The HP-75C portable computer has an Australian recommended price of A$1639. In America, it's US$995. However, in the US I've seen it advertised as low as US$745, whereas here in Australia everyone seems to sell it at the recommended price. (My example could equally apply to most other micros too).

I have three questions you might care to answer (if there is an answer):

1. Why do we Australians have to pay so much more for our computers?
2. Why is discounting rarely done in Australia, whereas it's so common in the US?
3. What's to stop me importing my next computer from America? Especially if it's battery operated like the HP-75C, which needs no power conversion.

PHIL CARTER
Warrnambool, VIC

The answers could fill a magazine, but here is a shorter attempt:

1. It depends on what you buy and who you buy it from – some people are just plain greedy, in some cases there are too many people in the distribution chain, and some distributors are quite fair. They do have to pay freight (usually air) and duty/sales tax, don't forget. We buy a lot of sophisticated equipment and, until the Oz dollar went flakey, we always paid US list price for it here – our supplier believes in cultivating his market, rather than getting in for the quick buck . . .

2. If you look at the state the US computer companies are in on the stock market at the moment, perhaps you could deduce that discounting isn't always a good thing. Discounting is viewed with suspicion by a lot of Australian buyers, and rightly so – if you get stuck without support in this business, it can cost you a lot more than that initial saving. Many computer businesses set up as discount operations have failed because of this buyer suspicion.

3. The same principles as for discounting apply here – go for your life, but don't come to me with your problems when you get back and it stops working. A big percentage of a dealer's margin is there to cover his overheads and that includes time spent holding the customer's hand after purchase, as well as service. If everyone buys elsewhere, then goes to him for handholding, they'll find he's not there. If he is there, he has no incentive to help you – and even if he does, you'll be at the bottom of the priority list each time, behind the customers who have kept him in business.

Not Only Games

I HAVE ENJOYED your magazine for some time but note in your 'Cash and Carry Computers' review that you reviewed all the other computers as computers but the Wizzard as purely a games machine.

I have a Wizzard and I am quite happy with it, but would like an occasional article on it – everyone writes about MicroBee and Vic 20 but not the Wizzard.

Mr D. JESSER
Manly, Qld.

A Serious Computer

I AM DISAPPOINTED that you haven't a page (or pages?) on the Commodore 64 as you have for many other computers. This seems particularly odd as it has been out a while and is probably Australia's most popular 'serious' computer. I hope to see the pages soon.

MR R CHALMERS
Walkerville, SA

As you may have noticed, for the past couple of issues Andrew Farrell has been combining his VIC-20 column with Commodore 64 information.

Up To Atari Users

I AM WRITING to you about the 16-page 'Pocket Programs' special in *Your Computer*. As an owner of an Atari 800 I was disappointed not to see any programs in it for the Atari computer.

Could you please put some in your next issue if any are available at time of press. Thank you.

MR G WARNE
Teatree Gully, SA

If there is a shortage of Atari 'Pocket Programs' it's because Atari owners haven't sent any in to us – we have no innate prejudice against Atari computers. How about it, Atari lovers?

Kodak User Group

KODAK AUSTRALIA and our parent company, Eastman Kodak, are finding great productivity gains as a result of the increasing use of personal computers in the work environment.

As a result we have formed the 'Kodak Australasia Personal Computer User Group', and are eager to exchange newsletters and technical notes with any other companies that may have a similar group. Within Kodak we have basically three makes of personal computers: IBM, Apple and Tandy.

MS D SCHEMBRI-HARDY
KAPCUG, Building 17
PO Box 90
Coburg 3058

your computer book reviews

Digital Electronics – Build Your Own

By Eric B Lindsay

MANY TEXTS about digital electronics are extremely valuable in most ways, but have the disadvantage that they are usually entirely theoretical. You may be able to understand exactly what is going on, but in the real world things just don't work out as they should. Unfortunately the only way to really learn digital electronics is to build things, and keep working at them until they work. This can be a considerable problem for the beginner, since there is often no one to turn to when things go wrong – and they always do go wrong!

About the best that can be done is to find a textbook that emphasises a practical approach and build up every gadget in that text. This provides experience in building, makes you familiar with some circuits, and provides a bit of information about what a circuit should be doing, and how to fix it.

The best book I have seen in this style is George Young's 'Digital Electronics: A Hands-On Learning Approach' (Hayden, Rochelle Park, N.J. 1980). This is intended as a class textbook for a group with an instructor, but can be used for self-study. I used it at the local computer club, where several people told me it was too simple (I think they wanted to start by building a better version of the IBM-PC). I then had the considerable satisfaction of watching half a dozen grown men spend most of the meeting trying to get a LED to light (the problem was that the batteries were dead, and it took a 12-year-old to point this out, by turning off the lights so you could actually see the feeble glow from the LED). In short, the book begins simply, but rapidly works up to a reasonable level.

You start by obtaining a solderless breadboard on which are built all the projects. You learn how to test and identify diodes and transistors, and having seen how transistors act as inverters, go to the 7404 hex inverter and learn how to use and make AND, OR, NAND and NOR gates.

There are chapters on making flip-flops, clocks and counters, plus details of how to test most of the chips you encounter in these chapters. You learn how to burn PROMs on the breadboard, how to make LED seven-segment displays read a microprocessor bus, how to decode address lines, and how to encode keyboards.

There is virtually nothing on the microprocessor, and although there is a chapter on power supplies, I would suggest that unless you are already used to building them you try another text for more details.

The chapter on troubleshooting is rather nicely done, and includes a few hints I hadn't seen elsewhere. There are also hints on building some test equipment, and ideas on designing printed circuits. Some of the chips used are rarely seen these days, but this is not particularly relevant to the use of the book as an introduction.

If you can't find Young's book, you could try 'Digital ICs – How They Work And How To Use Them' by Alfred W Barber (Reward, NY, 1980). This is slanted more at the technician working with already built equipment, but does cover much the same ground. Since both books are about the same price ($11.50), I'd say buy Young if you can find it. It will teach you more since it does emphasise getting out and building the stuff yourself.

When you get a bit more experience you might like to expand your horizons with 'Digital Electronics Troubleshooting' by Joseph J Carr (Tab 1250, Blue Ridge Summit, 1981). Despite the title, this is as much a learning book as a troubleshooters' guide, but it covers a much wider variety of circuits, including number systems, the various codes used in computer systems, the merits of different logic families, arithmetic circuits and other devices right up to microcomputers, where the Z80 is considered. Designs for memory-mapped and port I/O are given, and various power supplies are considered, together with common problems. This is a more advanced book, but very handy once you have covered the material in the earlier ones.

'Understanding DC Power Supplies' by Barry Davis is a textbook intended for radio/electronics apprentices and technicians, and it provides a complete coverage of all power designs, including integrated voltage regulators and switched mode supplies. The mathematics is kept simple, but complete enough to calculate the requirements for any power supply. About the only thing missing is methods of calculating the power handling capability of an unknown transformer, and I mention that only because some of my supplies have transformers that started life in some valve-model televisions. Prentice-Hall of Australia are the publishers, and the price is $10.95.

Designing Your Own Projects

By Eric B Lindsay

AFTER YOU HAVE some experience in making simple projects, you will want to design your own or make modifications to existing equipment. Unless you have several years of back issues of electronics magazines (in which case, you don't need my advice) you need a source of ideas. John Markus has compiled a variety of circuits from magazines and books in 'Digital Circuits Ready-Reference', from McGraw-Hill. The price is fairly high at $17.95, but if you make use of a few of the circuits the cost will easily be worth it for the time and effort saved.

There is an excellent index to the types of circuits, and they are also grouped in chapters by function. Despite my admiration for this book, I must admit that you may find circuits in it that simply don't work. The circuits are taken from a variety of sources, some more reliable than others, and some use circuits that are not particularly good design practice.

If you get serious about digital electronics you will need data sheets for the various chips. You can often pick these up free from manufacturers, or when you buy chips. Most manufacturers also sell data books at prices ranging from $7 to $15. However, when you have different books for TTL, CMOS, memories, CPUs and so on, the cost becomes a problem, particularly for the hobbyist.

I recommend the 'Microcomputer Datenbuch' from Elcomp/Hofacker, which was selling at the APC show for $15. This contains 846 pages of data sheets selected to cover most of the chips used in most popular microcomputers. It includes TTL, CMOS, voltage regulators, RAM, EPROM, EEPROM, ROM, CPUs and support circuits. I usually try this book first when looking up details of a chip. Since there may not be a local distributor as yet I'll give the publisher's address: Ing. W. Hofacker GmbH, Tegernseerstr.18, D-8150 Holzkirchen, West Germany.

Incidentally, only the front and back covers are in German; all the data sheets are in English. ▶

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your computer book reviews

The Crooked Computer

By Eric B Lindsay

"IT WAS THE most heroic battle of all time – one man against the world of computers." If 'The Crooked Computer', by William G. Shingler, Jr. (Manor Books, 1979, New York) had a price tag higher than $1.95 I would have thrown it back on the pile of 'humour' books. However, I needed something to read on the train, and the latest *Your Computer* wasn't available.

The cover blurb was totally misleading, for the book is neither a novel, nor particularly humorous. Although written as fiction, it is an introduction to many of the ideas needed to understand computers. Since it has a fictional framework there is no room for extensive explanations, but it does touch on Babbage, Hollerith, Jacquard, Boole and James Powers by way of historical background.

It introduces Oswald the Operator, who wants to be a programmer because it pays $500 extra per month, and who is making extra money on the side by sending out all the company bills twice. Albert the Applications Man has a degree in psychology and is determined to learn BAL (Basic Assembler Language – the entire book has a moderately strong IBM slant), and on the side runs a software business that only sells programs developed for the company by which he is employed full-time. Tom the Business Graduate is a COBOL programmer, who buys whatever happens to be in the company's warehouse and then sells it back to the company at a profit, without ever removing it from the warehouse. Their supervisor has seniority rights to the roundeds, and the company director uses foreknowledge of the computer-determined buy and sell points for stock to make his percentage.

The development of the various computer languages, from machine code through assemblers, compilers and higher-level languages is covered in a vaudeville routine with a vampire (no, I'm not making this up!). One chapter with the wonderful title 'Conspiracy: There are dozens of wonderful languages, but we only teach COBOL' reminded me of most university courses, and even explains why COBOL is often the only language offered. One very funny piece introduces Percy Limpwrist, the IBM salesman who is too timid to argue, and whose only joy is solving problems. It must only be fate that decrees that each solution involves enormous expenditure on IBM equipment...

Although this book will not be much use to anyone who has been involved with computers for more than a few months, it makes a very cheap and readable introduction to some of the concepts involved. Children would find it acceptable as an introduction before going on to a more formal textbook. I thought it was a bit tedious in places, but some of the character sketches were a delight, as were a few of the comments about computer manufacturers and languages. □

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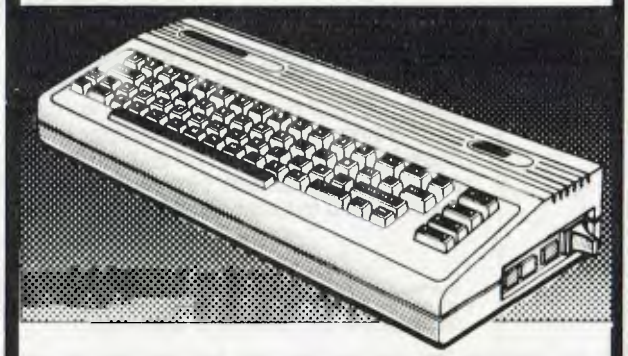

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NOTE: Some programs may require 16K memory module.

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Sound For The Sinclair

Benjamin Smith has found a way, without any hardware modification at all, to add the capability of sound to the Sinclair ZX81.

THE SINCLAIR happens to operate on frequencies that may be picked up on a simple AM or FM radio, and by putting these frequencies under software control, realistic electronic sound can be produced.

When a switch is made from 'slow' to 'fast' mode, a single 'blip' is produced which, if rapidly repeated, creates oscillations which are detected by the human ear as an uninterrupted pitch that varies in accordance with the interval between each 'blip'.

Unfortunately, BASIC is too slow to produce sounds of a high enough frequency to be of any use, so it is necessary to use a machine code subroutine such as that given in Listing 1, which uses a delay loop to determine the frequency, and calls the 'slow' and 'fast' routines in ROM to produce a sound. The parameters for frequency and note length are stored in the two bytes of the unused system variable at address 16507.

```
SOUND           LD   A,(16508,LENGTH)   ;Length into A.
                LD   C,A                ;Transfer to C.
LENGTH LOOP     LD   HL,16507,FREQ      ;Address of freq. to HL.
                LD   A,255
                SUB  (HL)               ;A is 255 - frequency.
                LD   B,A                ;For DJNZ loop.
OSCILLATE       PUSH BC                 ;Save loop registers for CALLs.
                CALL SLOW
                CALL FAST               ;Produce a sound.
                POP  BC                 ;Loop registers back from stack
                LD   A,(16507,FREQ)     ;Frequency into A.
DELAY           SUB  1                  ;Decrement A.
                NOP
                NOP                     ;Short pause.
                JR   NZ,DELAY           ;If A ≠ 0, repeat.
                DJNZ OSCILLATE          ;Repeat 'blips' until B = 0.
                DEC  C                  ;Decrement length counter.
                JR   NZ,LENGTH LOOP     ;Not zero? Then repeat note.
                RET                     ;Else back to BASIC.

(Nb: The NOPs, and the use of SUB 1 rather than DEC A is for timing
                                                        purposes.)
```

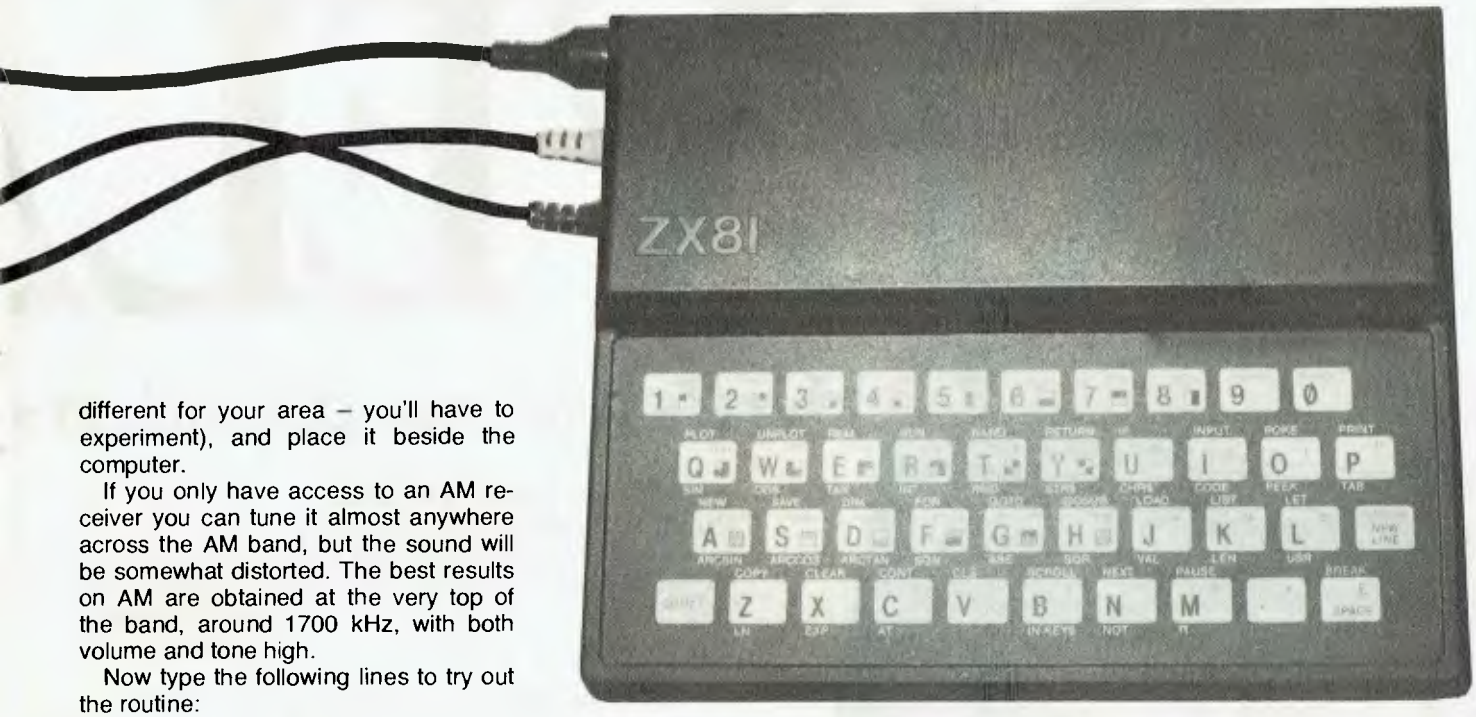
Listing 1.

To get the routine into RAM, enter the BASIC program in Listing 2, and RUN it. You will find that line 10 becomes filled with a series of apparently random characters; these are the bytes of machine code which are POKEd in, based on hex coded data in line 20.

```
10 REM ..................................(34 periods)
20 REM 3A7C404F217B403EFF9647C5CD2B0FCD230FC1
       3A7B40D601000020FA10ED0D20E3C9
30 LET A=16554
40 FOR B=16514 TO 16547
50 POKE B,(PEEK A-28)*16+PEEK (A+1)-28
60 LET A=A+2
70 NEXT B
```

Listing 2.

To produce the sound, an FM radio is preferable. Switch it on with the volume about halfway, extend the aerial if it has one, tune to about 106 MHz (it may be



You can give your ZX81 sound capabilities without any hardware modifications at all — just follow the instructions in this article.

different for your area – you'll have to experiment), and place it beside the computer.

If you only have access to an AM receiver you can tune it almost anywhere across the AM band, but the sound will be somewhat distorted. The best results on AM are obtained at the very top of the band, around 1700 kHz, with both volume and tone high.

Now type the following lines to try out the routine:

```
 20 LET A$="140120095086065050035025"
 30 DIM F(8)
 40 FOR I=1 TO 8
 50 LET F(I)=VAL A$(I*3-2 TO I*3)
 60 NEXT I
 70 PAUSE 32768
 80 POKE 16507,F(VAL INKEY$)
 90 POKE 16508,1
100 LET X=USR 16514
110 GOTO 70
```

This turns the computer into a simple, one-octave organ. Lines 40 to 60 assign the various values for the frequency byte, which correspond to the notes of the octave commencing at the C above middle C. Line 70 waits for the user to press a key (1 to 8 to produce a note, any other to end the run), line 80 assigns the correct value to the frequency byte, 90 specifies a '1' length note and 100 calls the sound routine by the use of the USR function. Line 110 returns control to line 70 to get another key.

Type RUN, then type keys 1 through 8 one at a time. If you do not hear the correct sounds, or any sounds at all, adjust the tuning on the radio. If there is still no result, you may have made an error typing the program to load the machine code, in which case (sorry!) you'll have to start again from scratch.

Table 1.

Note	Value	Note	Value	Note	Value
C	140	C#	130	D	120
D#	100	E	95	F	86
F#	70	G	65	G#	57
A	50	A#	41	B	35
C	25	C#	20		

Note that the values of the length byte are usually between 1 and 9 (0 is the same as 256); any above 9 result in notes that are much too long for most purposes. The value 255 produces a note lasting over two minutes.

The frequency byte can contain any value from 0 to 255, but above 150 or below 20 produces problems with note length. Table 1 shows the frequency byte values that correspond to the notes of the octave and a semi-tone commencing at the C above middle C. When using the sound routine, it is best to keep within this octave.

Sample Program

The sample program in Listing 4, which will just fit into the 1K machine, demonstrates most of the facilities of the sound routine. It allows the user to input a tune as a coded string, which the computer then plays. The string is typed in the form:

<pitch><length><pitch><length> . . .

ending with NEWLINE. The length is simply a single-digit number which is POKEd directly into the length byte (line 110), and the pitch is a single-character hexadecimal digit from 1 to E representing one of the notes of an octave.

The program prints out a table of the notes and their codes (line 70) based on data contained in the string variable, B$, given in line 40. The data for the frequencies is, as in the previous program, stored in the array F, obtained from the string A$, specified in line 30. The tune is input in line 90, and played in line 100 to 140 by assigning the frequency and length bytes from the string containing the tune, then calling the sound routine (line 130). Line 150 is necessary as the machine is always in 'fast' mode following the execution of the routine. Naturally, line 10 should be produced by the machine code loading program above.

```
 10 REM (machine code)
 20 DIM F(14)
 30 LET A$="140130120100095086070065057050041035025020"
 40 LET B$="C C#D D#E F F#G G#A A#B C C#"
 50 FOR I=1 TO 14
 60 LET F(I)=VAL A$(I*3-2 TO I*3)
 70 PRINT CHR$ (I+28);". ";B$(I*2-1 TO I*2)
 80 NEXT I
 90 INPUT A$
100 FOR I=2 TO LEN A$ STEP 2
110 POKE 16508,VAL A$(I)
120 POKE 16507,F(CODE A$(I-1)-28)
130 LET X=USR 16514
140 NEXT I
150 SLOW
160 GOTO 90
```

Listing 3.

If you have 16K of memory available, you might like to extend the program to allow tunes to be edited, saved on tape, and even input directly (so that you hear the note when you enter it). You could use the sound routine as the basis of games such as the type where you have to keep track of a sequence of tones and play them back to the computer, or one where you have to state whether the interval between a pair of notes is greater than, less than, or the same as that between another pair of notes. Happy composing! ❑

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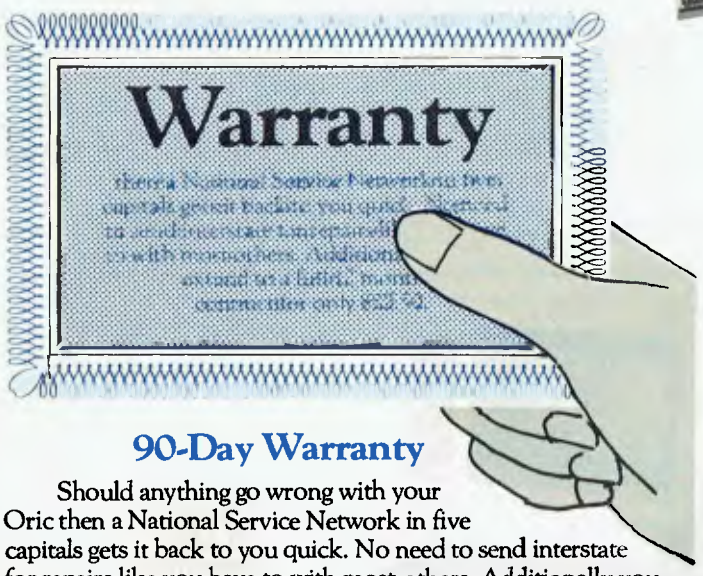

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your OSBORNE computer

By Steve Townsend

THERE ARE some simple ways you can make better use of your printer. One of them is to use CP/M's control-P command.

Whenever you're in CP/M (whenever you see the 'A>' prompt), entering control-P sends everything on the screen to the printer. It acts as a toggle switch – enter control-P again and you stop the transmissions to the printer.

One of the most useful aspects of this command is in printing out a permanent record of what you have on a disk. Here's how to do it.

Boot your CP/M disk (the one with XDIR.COM on it). Put the disk for which you want a printed directory into B drive. When you have the 'A>' enter:

XDIR B: ↑P <RETURN>

You won't see the ↑P appear on the screen, but your printer will spring into life and neatly record the contents of disk B, together with file sizes and space remaining on the disk.

Another useful ability of the control-P command is in sending a control command to your printer. Suppose your printer needs to receive 'ESC L13' to start one-and-a-half spacing. (<ESC> is the escape key.) When you have 'A>', enter:

↑P<ESC>L13 <RETURN>

This will send the code to your printer. Some printing modes are terminated by a <RETURN>. This is often the case with expanded character mode. Since it is usually used as a heading, it's useful to have it switched off after you go to the next line. Obviously if this is the case with your printer, it's no use trying to send this code via control-P because it will be terminated by the <RETURN> in your entry line.

Another useful application of control-P is in printing files. In this case you use it with the TYPE command. This is a resident CP/M command that is loaded as soon as you boot the machine. If you have 'A>' and enter:

TYPE B: <filename> <RETURN>

you will see the contents of the file displayed on the screen (providing it's an ASCII file). Of course, if you enter control-P first, it will also be output to your printer.

Typewriting with PIP

There is a useful PIP command which gives your system the ability to act as a typewriter. Boot a disk which has the CP/M command PIP. Enter:

PIP LST: = CON:

This will send whatever you write on the console to your printer. (The 'LST' is an abbreviation from the dim, dark past when a printer was known as a list output driver.) As soon as you enter a character it will be printed. You can use the backspace arrow to correct what you have written on the screen, but it will only overprint what is on your piece of paper.

This PIP command has another drawback; when you press <RETURN> you only get a carriage return and not a line feed as well. Therefore each time you want to start a new line, you have to hit the carriage return and enter a control-J. When you have finished writing you quit the command with a control-Z.

Envelope Addresser

I often find the need to address an envelope and don't want to go to all the trouble of starting up a Wordstar file. I can't address the envelope using the control-P facility because it keeps printing 'A>' at the start of each line. The PIP command will address an envelope but if I make an error I've mucked up the envelope.

Therefore I've written the following MBASIC program. It works remarkably well.

```
10 DIM A$(20,5)
20 PRINT CHR$(26)
30 PRINT:PRINT:PRINT:PRINT
40 PRINT "ENVELOPE PRINTER"
50 PRINT:PRINT:PRINT:PRINT
60 PRINT "WHAT IS THE SIZE OF TYPE"
70 PRINT "ON YOUR PRINTER?":PRINT
80 PRINT "1. 10 PITCH (PICA)"
90 PRINT "2. 12 PITCH (ELITE)":PRINT
100 INPUT "ENTER 1 OR 2"; PITCH$
110 IF VAL(PITCH$) = 1 THEN P = 10
120 IF VAL(PITCH$) = 2 THEN P = 12
130 PRINT CHR$(26)
140 PRINT:PRINT:PRINT:PRINT
150 PRINT "WHAT SIZE ENVELOPES DO"
160 PRINT "YOU WANT TO PRINT?"
170 PRINT:PRINT:PRINT
180 PRINT "1. STANDARD, SHORT"
190 PRINT "   (10cm X 16cm)":PRINT
200 PRINT "2. STANDARD, LONG"
210 PRINT "   (10cm X 23cm)":PRINT
220 PRINT "3. A4 SIZE (60cm X 72cm)"
225 PRINT:PRINT:PRINT:PRINT
230 INPUT "ENTER 1, 2 OR 3:";SIZE
240 ON SIZE GOTO 1000,2000,3000
1000 I = 2: R = 27: GOTO 4000
2000 I = 3: R = 27: GOTO 4000
3000 I = 5: R = 40
4000 PRINT CHR$(26)
4010 PRINT:PRINT:PRINT:PRINT
4020 PRINT "HOW MANY ENVELOPES"
4030 PRINT "DO YOU WANT TO PRINT?"
4040 PRINT:PRINT:PRINT:
4050 PRINT "ENTER A NUMBER"
4060 INPUT "BETWEEN 1 AND 20 ";N
4070 PRINT CHR$(26)
4080 FOR K = 1 TO N
4090 PRINT:PRINT:PRINT:PRINT
4100 PRINT "ENVELOPE NUMBER ";K
4110 PRINT:PRINT:PRINT
4120 INPUT "1ST LINE: "; A$(K,1)
4130 INPUT "2ND LINE: "; A$(K,2)
```

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```
4140 INPUT "3RD LINE: "; A$(K,3)
4150 INPUT "4TH LINE: "; A$(K,4)
4160 INPUT "5TH LINE: "; A$(K,5)
4170 PRINT CHR$(26)
4180 NEXT K
4190 FOR L = 1 TO N
4200 PRINT:PRINT:PRINT:PRINT
4220 PRINT "ENVELOPE NUMBER ";L
4230 PRINT:PRINT
4240 PRINT "POSITION YOUR ENVELOPE:
4250 PRINT "BEHIND THE PLATEN"
4260 PRINT "AS THOUGH YOU WERE"
4270 PRINT "GOING TO ROLL IT IN"
4280 PRINT:PRINT:PRINT
4290 PRINT "WHEN YOU ARE READY"
4300 PRINT "PRESS ANY KEY"
4310 CHAR$ = INPUT$(1)
4320 PRINT CHR$(26)
4330 FOR J = 1 TO R:LPRINT:NEXT J
4340 FOR M = 1 TO 5
4350 LPRINT TAB(I*P) A$(L,M)
4360 NEXT M
4370 FOR E = 1 TO 22: LPRINT:NEXT E
4380 NEXT L
4390 PRINT:PRINT:PRINT:PRINT:PRINT
4400 PRINT:PRINT "FINISHED"
4410 END
```

This program will prompt you for details on whether your printer is using 10 or 12-pitch type, what size of envelopes you are printing and how many you want. You then enter all addresses in response to prompts. A maximum of five lines per envelope is allowed, with a maximum of 20 envelopes. You could enlarge these numbers quite easily by changing the program.

Once all your addresses are loaded, you position an envelope at the top of the platen as though you were about to roll it in. Press any key and the printer rolls the envelope in, addresses it and ejects it. You are then ready for the next envelope.

The constant 'R' determines the amount of roll-in; it is set here for a C. Itoh F-10. To modify it for other printers, change lines 1000, 2000, and 3000. Envelopes other than the three standard sizes given in the program can be accommodated by changing I as well as R. 'I' is the constant determining the amount the printing is indented. It occurs in lines 1000, 2000, and 3000.

The program was written to handle small numbers of envelopes and I doubt I will ever use it for more than half a dozen at a time. However, it can probably handle many more than 20. You can experiment with how many it could handle before exceeding memory capacity; change the dimension line 10 and the prompt line 4060.

For Osborne users who aren't *au fait* with MBASIC, here's how you use it. Start a file with the Wordstar 'N' option and call it 'ENVELOPE.BAS'. Copy the program listing very carefully and save the file. Boot your MBASIC disk. When you get the 'OK' enter:

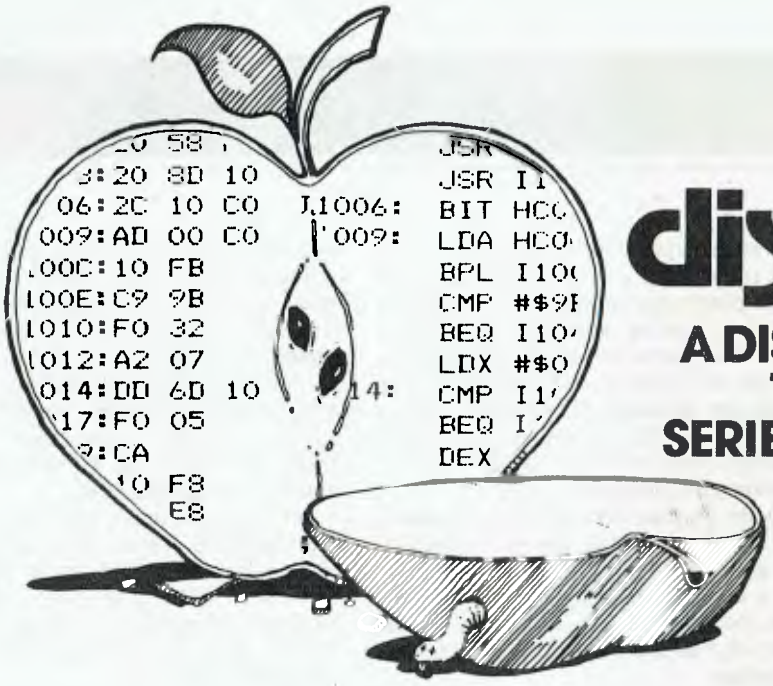
LOAD 'B; ENVELOPE.BAS' <RETURN>

When you get the 'OK' again, enter:

RUN

The prompts will take over from there.

It could be made even more convenient by changing it to run in CBASIC. It could then be compiled with CRUN2 into a COM file. ❑



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your TRS80 computer

By Rod Stevenson

ALONG WITH others of my particular circle of thinkers, I'm fairly frequently accused of undue favouritism to Tandy. It's true – I do keep referring to their add-ons as the thing to buy unless you know with absolute certainty that others have bought from other manufacturers with complete and utter satisfaction. And this means knowing them well enough to be able to believe assurances; it seems (sadly) to be a fact that none of us is ready to admit when we've made a poor buying decision, so keep praising the new item to potential buyers, admitting only to other owners its shortcomings.

My preference for Tandy equipment is not that I consider it superior in manufacture (or any other way), just that the possibilities for incompatibilities are so much less. One need only look in the American magazines to see the host of printer drivers that abound to make printers compatible with Scripsit; yet more for SuperScripsit. Certainly it's true these printers will work without a special driver, but then also without the special features that probably induced you to buy that particular printer!

But if you have a Tandy printer all the drivers you need are provided in the purchase price of SuperScripsit, and there have been numerous articles in the American specialist magazines on how to modify Scripsit.

The above was only by way of an example of the terrifying incompatibilities possible – System 80 owners won't need any more examples!

On the subject of modifying Scripsit, regular readers will already know, but I'll repeat anyway: Ian Robertson, the Scripsit expert of the Adelaide Users' Group, is beseiged from time to time with people wanting customised modifications. He asks $10-$30, depending on the complexities of particular requirements; good value compared with the time you would spend doing it yourself, particularly if you have a particular need to get a job done, as opposed to Ian's motive of enjoying the exercise. Contact Ian c/- 36 Sturt Street, Adelaide, 5000.

Is Yours Proportional?

Still on the subject of printers, and in particular, non-Tandy printers, various manufacturers advertise their printers as 'proportional'; sometimes it could be seen as misleading advertising, but easily excused by claiming ignorance on the buyer's part.

There are actually two 'proportional' concepts. One is the actual spacing allotted to each character; in normal printing a letter 'i' will take up less space than a 'w', the complexities of spacing being looked after by the type-font. On a non-proportionally spacing typewriter or printer both letters will take up equal space.

The other proportional spacing refers to word space, and is the one that some so-called 'proportional' spacing printers won't do. If a line is justified flush right in a true proportional mode each word space in the line will be equal – but it needs both the printer and the program to be capable of so doing.

Incidentally, there is a degree of 'incompatibility' introduced by using the proportional mode in the true proportional word processors such as SuperScripsit. The problem arises in trying to use a file written on a non-proportional program – space values are changed, so tables no longer line up. Too complicated to delve into here; just something to keep in mind when contemplating using a proportional program if you want to accept input from other programs.

Quality

Yet another instance of being led astray is if you glibly believe the advertisements which offer 'correspondence-quality dot matrix' printers. While the 24-wire heads are certainly an improvement, a side-by-side comparison leaves a lot to be desired to match a daisywheel quality. Usually speed is sacrificed for quality; have a look at the Tandy Daisywheel 2 before deciding this is always so. Yes, of course you pay for the quality at the speed provided, but how often do you get something without paying?

In saying this I'm not just being excessively demanding in my quality specifications. While dot matrix is probably acceptable in many applications, a particular instance I recently encountered was of a social worker using his computer as a word processor to write letters. Although from the text it was obvious that the letter could be only a personal one, containing specific details applicable only to the addressee, in these days of computer-generated 'help' great damage was done to his public image.

Justifying Myself

I seem lately to be needing to correct erroneous impressions imparted in earlier columns. So yet again ...

In both earlier discussions on importing software direct, I was thinking of the availability aspect, but it seems I should also have pointed out the large variation in prices charged. Some Australian agents receive an agent's discount from the publisher, allowing them to sell for a reasonable price after covering their own costs of importing and marketing. However, some seem to take advantage of the laziness inherent in most of us that we'd rather buy locally than write a letter or make a phone call of inquiry; they simply double the advertised American price. So again I suggest looking at the American specialist TRS80 magazines before you decide.

The other 'correction' I should make is to point out that I address my remarks broadly to TRS80 users, although there could be some 'pearls' for others! When I mentioned that spaces are not significant I was referring to our (the Tandy) version of Microsoft BASIC. I do realise on reflection (and after some prodding from the incensed) that I should have pointed out that not all versions are as easy to get on with. It seems the 'higher' versions of even Microsoft BASIC are sensitive to spaces, which is understandable when you consider their variable names are not limited to the two significant characters ours are. I understand MBASIC is so afflicted, as is the version of BASIC provided on the Model 4.

Model 4 vs. LDOS

Certainly the specifications for the Model 4 are very impressive, but what is not made clear is that quite a number of its DOS features are a standard part of LDOS (which is what TRSDOS 6 is) even on the Models 1 and 3.

Obviously if you're buying from scratch the Model 4 is the way to go, but there may be no need to forsake ▶

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your Model 3 or even Model 1 simply for the attractions of (for example) the Job Control Language, spooler, type-ahead buffer, or indeed most of the so-called 'features' of the Model 4. Just take a look at LDOS 5.1.3 for your present equipment.

Perhaps its very comprehensiveness works against LDOS. More than a few have expressed the thought that it's only for the 'advanced user'. Not so! The features are there for advanced use, but if you just want to use it as a more reliable TRSDOS that's all you need do. Indeed, I recommend this path; advance at your own pace when you feel the need or desire. It's all there waiting!

I apply the same recommendations to EDAS for someone looking for a disk-based editor assembler. Previously I'd recommended Microsoft EDTASM+, but this is no longer available.

Is Yours Centred?

With Model 1, centring the image on the monitor is quite easy. The screws in the bottom of the keyboard need to be taken out, but the actual case need not be taken off (yes, it's true the ribbon cable connecting the two circuit boards is somewhat fragile, so if you do take it apart at least be reasonably gentle).

Having removed the screws, re-connect the monitor and write a simple program to provide you with something to show each corner to enable you to judge when the image is centred. Then ease the right-hand end of the case apart (less than an inch is enough) until you see two small plastic wheels, which are the potentiometers controlling the position of the image on the screen. Use a screwdriver to adjust each while observing the image. That's all there is to it! It will be a long time till you find another hardware job as easy!

Line and Character Printer

Most line printers are just that – line printers. Not so with typewriters converted to be printers. Line printers will not print until a carriage return (enter) is sent, but typewriters will print as each character is sent because they don't have a line buffer as does a line printer.

So what, you say? So a typewriter which operates in the aforementioned mode will operate directly on-line from the computer's keyboard to print directly a key is pressed. Perhaps you don't have a great deal of use for the following one-liner, but it might be fun to try.

```
10  A$=INKEY$:  IFA$=""THEN GOTO 10 ELSE PRINTA$;: LPRINTA$;: GOTO10
```

This can also be useful in discovering some printer control codes available by holding shift down arrow (known as the control key on other keyboards) while trying various other keys.

Learning Assembly Takes Effort!

This heading says it all! While we are fortunate in having ample support tools to help (EDTASM, Howe's TRS80 Assembly Language Programming, Wadsworth's Z80 Instruction Handbook), there is still an effort required above that needed for BASIC mastery. But that's all it is – effort. With perseverance all will succeed. Having for three years conducted Assembly classes for the Adelaide Users' Group I can say so with ultimate and absolute confidence. And Assembly is so rewarding it really is worth the effort.

Not all computers have such adequate support for the learning of Assembly; this could be where the idea of mystery started. It would be difficult to teach oneself from scratch – but we TRS owners don't have to!

Hardware Problems

Being intensely software-oriented, and needing hardware only to test out my software, I find the smallest hardware fault or problem a source of annoyance and frustration. It is at such like minds that I address the following; I do realise some of you out there in reader-land actually delight in fixing hardware faults, and are sorry when all is working.

Yet another benefit of belonging to your local users' group is that when a fault develops you will be able to borrow other equipment to change piece by piece in an attempt to find the faulty piece; a failure is not necessarily where it seems.

A common problem with the Model 1 is the connecting cables; this will reveal itself at the change. If you have memory in the expansion interface, the 'sudden death syndrome' is usually a poor expansion connector not connecting with memory external to the keyboard. Gold edge connectors will certainly cure this cause, but a temporary cure and test is to clean the contacts. Faulty disk operation may be the disk controller circuitry, but it may also be faulty memory containing the DOS.

There is a theory that disk operation puts more stress on the computer in that it is 'busier' all the time, so use this theory by operating it as a non-disk system.

Probably the ideal fix is to find someone in your Users' Group who enjoys hardware, and do him/her the favour of letting him/her fix it! ❑

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your CP/M computer

By Bill Bolton

All Change!

UNLIKE SOME politicians, I have no qualms about revealing where my commercial interests are, so you can decide for yourselves if I have a vested interest in any issue. By the time you read this I will be working with Archive Computer Services in Brisbane. Archive is growing and will have a new name (ARCOM PACIFIC) and image. The company goal is to strive for excellence in all aspects of service and support of professional microcomputer software products. As excellence is hardly a word which could be applied to microcomputer software service and support in Australia at this moment, it is going to require a lot of effort to achieve that goal, but we are going to give it a good try!

I suppose there will be a lot of rumours about why I left NEC Information Systems Australia. Essentially, I felt I had done about as much as I could for the APC as a product, and the challenge of putting together a software support organisation that really works, through Archive, was too great to resist. Richard Berthet has taken over as APC Product Manager for NECISA (he's mad enough to even think the same way I do) and will continue the high level of product support that the company has always offered on the APC. NEC is a great company to work for and I certainly acquired a lot of new skills through my involvement with them.

dBase Convention

Ashton Tate is running a dBase conference in Los Angeles, which will all be over by the time you read this. However, I am attending and will have a report next month. The whole thing happened very quickly, but sounds interesting – it's being held on the Queen Mary at Long Beach.

I'll also be going to the Fall Comdex show in Las Vegas (along with the managing editor), and will have a few things to say about that in the next issue, too.

RCPMs and Public Domain Software

The Software Tools RCPM went offline on October 31st, having logged 9226 calls since May 14, 1982. The average length of call was 45 minutes and the maximum number of calls in any one day was 73. The system is packed up and sitting in storage. I expect it to come back on-line in Brisbane towards the end of January, 1984. To ensure there is a complete set of all the public domain software left in Sydney, I've made arrangements with a couple of users of my system to take copies of the entire SIG/M, CP/MUG and CUG collections. Copies from this set will probably only be available to other RCPM SYSOPs in NSW, not on a disk copy basis to individual users.

The combined collection is now over 250 volumes, and it's a major task to move and store a complete set. It has, for some time, been impractical to handle copying of individual disks from the collection on anything but a commercial basis, or through a well organised computer club. The message for users who want access to programs in the CP/M public domain collections is clearly this:

1. Get yourself a modem and suitable communications program and download it from an RCPM system.

2. Join a computer club that has part or all of the collections and make copies through whatever facilities the club can offer (for example, MICOM in Melbourne).

3. Buy the disks from a commercial supplier; around $15 a volume seems a fair price to me.

The collections are maintained on 20 cm single-sided, single-density disks and are most commonly distributed on that format. If you aren't running 20 cm disks, life becomes more complicated. However, downloading from an RCPM, while slow, completely avoids the disk format problem. Some of the commercial suppliers of public domain disks can handle mini-floppy formats, so you may be able to get them that way. At last count, Archive Computer Services could supply public domain disks on over 20 different mini-floppy disk formats.

The implied basis for commercial distribution of public domain material is that, "the charge should not be more than a reasonable copying charge and reasonable cost of media" and, "supply of public domain material should not be tied to, or conditional on, the supply of any other goods or services". Some RCPM SYSOPs offer to supply public domain disks on a commercial basis and use the money to support their RCPM operations, but generally they can only handle 20 cm disks. I don't work that way, but some other SYSOPs do, so it may be worthwhile asking.

Remote Systems

The response to my question on whether readers wanted to know about how to set up RCPM-type computer systems was very slow in coming in, but has now reached respectable proportions. As a starter towards that series of articles which should appear next year, let's take a look at some fundamentals.

To set up remote access on any computer system, you need to be able to do a number of basic things:

1. Automatically answer the phone.

2. Detect whether you have a genuine data caller or just a voice caller who got a wrong number.

3. Make the remote data caller appear as if they are the console or terminal for your system.

4. Monitor the call to make sure the caller is still there, and that they are actively using the system.

5. Provide a basic log count of the number of calls answered, the number that actually turn out to be data callers and the number of inactivity disconnects.

6. Be able to optionally perform local keyboard operations without the remote user seeing what was done.

7. Optionally hardcopy-log remote user input.

The program which performs these tasks is called a 'communications supervisor'. For CP/M-80 based systems there is a program, which generally goes under the name of BYE, that will perform all these tasks, plus a few extra ones. For other operating systems you will have to write your own, but they generally aren't difficult programs to write, once you understand what needs to be done. I will confine my remarks to CP/M systems, though the principles are generally applicable.

The BYE program must, necessarily, live outside the normal CP/M system image. Usually you construct a smaller than normal CP/M system. For instance, if you normally run a 64K CP/M system you would use MOVCPM to construct a 60K system, thus leaving 4K of memory space above the end of the CP/M system image in memory. The BYE program loads into this empty space above CP/M. With some computers it's impossible to make smaller CP/M system images, so the later versions of BYE can be configured to load below the CP/M system image (below the CCP). This does create some other difficulties, and the 'above CP/M' load is always preferable.

BYE exists in many forms in the CP/M public domain collections. I started out with a program called BYE72 and quickly found that it needed a lot of changes to make it suitable for Australian tele- ▶

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Sometimes the best advice can be the worst kind,
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communications conditions. I adapted the program, adding several new features to it. The current version is called BYE72L. A slightly earlier version with all the Australian modifications, along with my enhanced versions of the many other programs that make up an RCPM system, are available on one of the SIG/M volumes, in the range 70 through 80 (sorry, I can't remember which one). The latest versions have been submitted to SIG/M, but have not appeared yet.

Meanwhile, the Americans have also been at work on BYE and their latest version is BYEII+. When I get a chance, I will merge all my changes and improvements in with the American changes and improvements, to get an Australianised super BYE program (or maybe someone else will do it?!). The sections which follow describe the operation of the BYE program that I use – BYE72L.

The BYE program patches the CP/M BIOS jump table when it loads into memory. The BIOS jump table addresses for the console routines and printer routines are patched to point into new routines contained within the BYE program. The BYE console input routines in BYE interleave data presented by the local console with data presented from the modem, allowing data to be entered from either source. Usually, some special control characters are trapped from the local console only, and used by BYE to control special system functions (like the SYSTEM DOWN IN 5 MINUTES messages and so on). The console output is sent to the local console and to the modem. A special control character can be entered from the local console, which 'blinds' the remote user, so that they cannot see what is being entered locally.

To operate the printer routines, you usually just hit RETURN. Hitting control-P does nothing. The BYE program may use the BIOS printer routines to generate a hardcopy log of what the remote user types into the system. This usually enables you to tell what remote users have been using the system for, and, as the nature of remote access systems is to receive short commands and return large amounts of data in response, avoids wasting paper.

Let's define two terms: 'inboard' refers to the computer system that supports remote access; 'remote' refers to the data equipment (which may be a computer or just a terminal) using the remote access facility.

Telecom modems do a full internal auto-answer sequence without needing additional software control. All my BYE program does is look for the carrier from the inboard modem. Unless the modem has successfully answered a data call, there can be no carrier (except in one case, to be covered later), so carrier detect is the only indication of a data caller being present. The BYE program is performing a continual 25 second software timing loop, which will make the DTR line to the modem interface become inactive once every 25 seconds, UNLESS carrier or telephone ring are detected. If a voice call gets answered by the modem, the timing loop in BYE ensures the phone gets hung up in 25 seconds. The 'ring' signal resets the timer loop also to ensure that a remote data caller has the full 25 seconds to establish carrier, otherwise the timer loop might be near the end of a time cycle and drop the call just after the modem had answered it.

If the carrier from the remote user is lost due to an unreliable phone line, the 25 second timer loop will disconnect the call at the inboard end, after 25 seconds. There is one further condition to test for. If the remote caller simply hangs up, the line goes 'open' at the inboard end and starts to 'beep', indicating the person on the other end has hung up. Unfortunately, the tone used by Telecom for the beeps is within the bandpass of the original transmit carrier and so gets detected by the inboard modem as a carrier. The beeps occur every second or so and they reset the 25 second timer loop.....so the line never gets disconnected (hung up) on the inboard end. To overcome this, a count is kept of carrier losses. If they exceed 25 or so in any one call, the line is assumed to be either 'beeping', or so unreliable as to be not worth using. In either case it's disconnected.

As well as the 25 second carrier-detecting timer loop, a longer timer loop monitors the remote console input for activity. After a predetermined period of inactivity by the remote user (I set it to 5 minutes), a warning message is issued by the BYE program to the remote terminal. The message is something like ++AUTO LOGOFF IMMINENT ++, accompanied by several ASCII BEL characters, to attract the attention of the remote user. If no response is forthcoming within 30 seconds, control is passed to the CP/M transient program, to take further action. This is to force disconnection, after logging the name of the user who timed out.

This inactivity timeout only runs while a BIOS console input request is waiting for a response. If the remote user is running a program on the inboard system which outputs a lot of data without the need for user response, no BIOS console input requests will be made.

Other functions performed by BYE programs include setting up some minor aspects of the communications format to suit the remote user (number of nulls after each CR/LF and lower case operation), issuing welcoming bulletins, checking for an initial generic password and so on. Eventually, BYE will either pass control to CP/M command level or pass control to a CP/M transient program. In the case of my RCPM system, control is passed to the user log-on program, but with other systems it could be any sort of CP/M program.

BYE needs to be customised for the particular hardware used. The version I have developed is for a Godbout System Support 1 board, which includes a 2651 USART and a real time clock chip.

Barrie Hall, SYSOP of the SPA-RCPM, wanted to solve the problem for himself, as an exercise in communica- ▶

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CP/M

tions. Instead of using BYE, he wrote his own program, to achieve the same results. The CBBS software used by the MICOM-CBBS employs a different solution again, though the user interface is very similar.

PAMS News

For the first time, the PAMS list has fewer numbers on it this month than for the previous month. This situation should only last until the Software Tools RCPM comes back on-line in Brisbane.

I have some more details on the Melbourne CBBS systems, run by Bruce Alexander in conjunction with SCUA. The service is now running 24 hours, but software downloading is limited to SCUA members. Visitor access is allowed but visitors cannot use the file transfer capabilities. Membership of SCUA costs $16 a year.

It looks like there will be two new systems on-line in Sydney in the not too distant future. Steve Engel and David Hatch are both well advanced with plans to put systems on-line.

Bob Sherlock, SYSOP of the Gippsland RCPM, reports that 95 per cent of calls to his system are STD calls. On current projections, his system will generate revenue of approximately $70,000 for Telecom in a full year of operation. After getting the figure from Bob I sat down and calculated what the Software Tools RCPM was earning Telecom. Only about 35 per cent of calls to the system were STD, so my projected revenue for Telecom was somewhat lower, but still came in at around $15,000. The MiCC BBS would generate about the same figure. You'd think that they'd let us have the RCPM phones rental free when the RCPMs can generate that much revenue on a single line! ❑

PAMS Numbers

Mi Computer Club BBS (MiCC-BBS): (02) 662-1686 24 hours EST
Micro Design Lab RCPM (MDL-RCPM): (02) 663-0151 24 hours EST
Sydney Public Access RCPM (SPA-RCPM): (02) 808-3536 24 hours EST
Melbourne CBBS (MICOM-CBBS): (03) 762-5088 24 hours EST
Sorcerer CBBS (SUGA-CBBS): (03) 836-4616 24 hours EST
Gippsland RCPM (GL-RCPM): (051) 34-1563 24 hours EST
Perth RMPM (WA-RMPM): (09) 381-6070 6pm-9pm WST.

your APPLE computer

By Bradley Thurkettle

THIS MONTH I'm going to be talking about taming the RESET key, and a software competition where you can win real money.

The Impregnable Program

Before this article, the closest you could get to the impregnable program was the ONERR GOTO statement, but unfortunately this only handled CONTROL-C interrupts. What could be done about RESET?

On pages 36 and 37 of the Apple Reference Manual there is a detailed description of the operation of the RESET key, but it is very technical. Translated it means that whenever the RESET key is pressed the Apple will go to the address it finds at locations 1010 and 1011. (Or, for those of you with sixteen fingers, $3F2 and $3F3)

How can we use this, you cry; well, it just so happens that the Applesoft RUN command lives at location $D566, so if we put this address at 1010 and 1011, whenever RESET is hit it will be just like typing RUN.

To put this in your program you would add these lines early on in the program:

```
POKE 1010,102 :REM $66
POKE 1011,213 :REM $D5
CALL - 1169:REM SET UP POWER-UP BYTE.
```

Explanations:

1. The reason the address is given back to front is because that is the way the computer expects it. That may be a slightly ridiculous explanation but there is no other, and you'll just have to get used to it if you wish to muck around any more in machine language.

2. The POWER-UP byte is at location 1012 (or $3F4 if you prefer). This is used by the Apple to tell itself if it has just been turned on (a silicon version of the Grafenberg spot?). If not correctly set up, the Apple will think, next time the RESET key is pressed, that it has just been turned on and will promptly reboot itself (which means it erases any program in its memory and goes to look for a disk drive, obviously not a nice thing to happen when you've just spent the last hour typing in a program).

Other Uses

The above demonstration showed one use of the RESET key, but there are of course others. Try deliberately not setting up the POWER-UP byte; then, when the RESET key is pressed, the Apple will start up again, preventing any illegal tampering with your program.

Both the above examples leave the program in total control of the machine and would be useful primarily to teachers writing a program to test students, because it prevents cheating through program tampering. I had my school's Apple giving me 200 per cent for a chemistry test – shame it couldn't be done in the HSC.

Single-Key Catalogue

You can also divert the RESET key to your own machine language programs, which can then go and do anything you want; for example, catalogue a disk.

Program 1: Single-key catalogue

```
10 POKE 1010,0 : POKE 1011,3 : CALL - 1169
20 POKE 768,32 : POKE 769,110 : POKE 770,165
30 POKE 771,76 : POKE 772,3 : POKE 773,224
```

Going through the program line by line:

Line 10: this sets the RESET key locations to point to address $300 (where we will put our program).

Line 20: Does a GOSUB to the CATALOG command at address $A56E.

Line 30: Jumps back into Applesoft at location $E003.

Now, after this program is run, whenever you press RESET the Apple will catalogue the disk for you.

The AUSOM Challenge

The Apple User's Society of Melbourne (AUSOM) is holding an Apple software contest, open to any member of a recognised Apple User's group. The contest has three categories, but entries have already closed for the business section. The remaining categories and their associated prizes and closing dates are:

Games: first prize $250; entries close 4.2.84

Education: first prize $500; entries close 2.6.84

The contest is sponsored by Verbatim Australia Pty Ltd, and there are also consolation prizes of Verbatim clocks. All registered entrants will receive a Verbatim Datalife Twin Pack.

If you're interested, send a stamped self-addressed envelope stating your category to:

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Lose a Turn.

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Congratulations!
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Advance to Finish

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Lose a Turn.

JAIL

...read the book!

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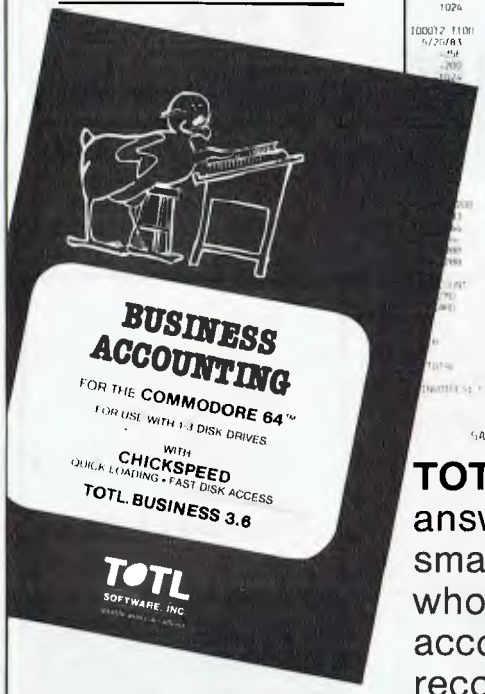

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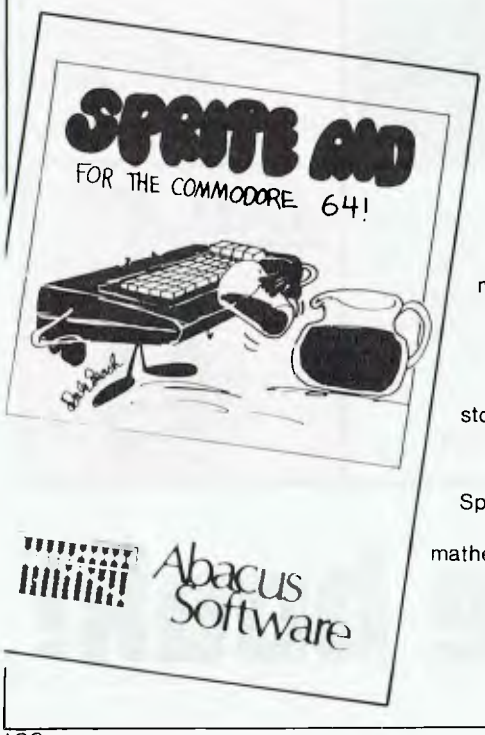

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your VIC 20/C64 computer

By Andrew Farrell

THIS MONTH has seen a huge increase in the software available for the C64, along with the release of several interesting new peripherals in the US. The VIC-20 is still very popular at the low entry level, but will probably be phased out by Commodore late next year.

Support for both computers will continue, especially from independent companies. The new Executive 64 should arrive not long after Christmas and will retail for around $1800.

New hardware to be available in coming months includes:

A 128K expansion unit (for the C64 ... bound to have at least one use!).

Parallel printer interface.

80-column card (C64 ... CP/M?).

High-speed disk drive (the sooner the better).

Voice synthesiser.

Several thousand new brands of joystick (perhaps one of them will be totally indestructible).

Most of the above are now available overseas for both the VIC and C64, so hopefully we might see them here soon.

Software

It just isn't possible to keep up with the flood of programs arriving from all directions (who said the 64 has no software?). Here is a rough summary of some of the better offerings.

'Hustler' is a great game to show a neighbour who is sick and tired of being kept awake by the sound of Matrix or Jumpman. The game is an entertaining simulation of pool, complete with the theme from Pot Black and around six game variations.

The players control their aim by positioning a cross on the screen and pressing the fire button (yes, it uses a joystick) to shoot. You may hit the ball with varying power, to send the white ball bouncing around the table, or just give it a gentle nudge.

Hustler has impressive music and graphics, is fairly realistic, and provides a good break from 'ye olde shoot 'em down games'. It is for the 64 and sells for $22.95 on cassette, from Progressive Software.

Scrambler fans will love 'Skramble', for the VIC-20 or Commodore 64. Both versions have the usual selection of sectors to cover, with the ultimate aim of destroying the Star Base deep within the caves.

The 64 version (Super Skramble) is far more than a souped-up VIC version. It has full bit-by-bit scenery scrolling, and its nasty rockets, meteors, blips and a fierce maze constitute a hard combination to master.

Colourful graphics and sound make Skramble a very good imitation of the arcade favourite. It's available for $19.95 (VIC) and $24.95 (64) on cassette, from Ozi Soft.

VIC-20 Expansion

One of the VIC-20's big features is its ability to expand with your needs. This usually involves purchasing several memory cartridges and some form of expansion board.

Now, you can go all the way in one hit, using the 27K memory expander from Ramax. The unit is housed in a protective plastic cover which leaves only the two expansion ports, a set of DIP switches and the fuse exposed.

The memory on-board may be reconfigured to include any of the additional 8K blocks, a games cartridge or the lower 3K area. One of the DIPs also allows a reset to be performed, although it's a little tricky to do without a steady hand and a small screwdriver.

Ramax is available direct from Computer Extra in Victoria, or by mail order, for around $249. For further details contact Tim Hehir on (03) 338 8137.

Mailbox

From now on I'll be reserving a section for interesting letters received over the previous month, so start writing in with your problems or questions.

This month, I got a couple of pretty hot scores and some game recommendations from Nicky Graetz of Rochester. Nicky has had his VIC for almost a year and says:

"... Of all the games I've bought, some of the best are Gridrunner, Abductor, Omega Race, Serpentime and the Scott Adams Adventures." On Gridrunner, Nicky managed a sound score of 184,590. That beats my highest! Nicky also scored 215,000 on Omega Race, and says the Super Expander cartridge is very useful for music as well, a fact which many people don't seem to realise.

C64 Tips

A few more for the Commodore 64:

POKE 808,255 – disables the Runstop and Restore keys.

POKE 808,235 – enables the Runstop and Restore keys.

POKE 808,239 – disables Runstop key.

POKE 808,237 – enables Runstop key.

Location 808 is part of the kernel ROM stop routine jump vector (low byte). By changing the values of these vectors we can make the computer jump to a different routine or simply return and do nothing.

Locations 794-819 all contain vectors to various routines, including Load and Save. Most other vectors are stored in the kernel ROM itself.

Printers

Due to the withdrawal of the 1526 printer, many users have asked about the possibility of interfacing other printers to the VIC-20 or C64.

At the moment there are two feasible methods – RS232 and parallel. Both methods involve purchasing an adaptor or cartridge. An RS232 connection will involve making a suitable cable and possibly some form of driver program.

The most economical method is to purchase a parallel interface which connects to the serial port, thus allowing full compatibility with existing software as well as a range of printers.

The FAX-80 or PX-80 provide similar quality and features to the 1526 for around $500. The parallel interface contains several ROMs which handle the necessary conversion from CBM ASCII to standard ASCII, as well as handshaking. I'll have more info next month. ❑

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Tandy Colour Computer: 16K Ext BASIC plus line printer VII plus about $250 worth of software and books, $700 ono, must sell. Phone Peter on (03) 368-1862.

TRS-80 Software: Trade/sell. Send original TRS-80 cassette program or $10.00 for copy of Space Piracy, a conquest/trade game. SSAE. Mr E Hughes, 52 Lowry Street, Cardiff 2285.

Computer & Video Exhibition: Portland Civic Hall. 28 Jan – 3 Feb 1984. Exhibitors wanted. Enq bh (055) 23-2671, ah (055) 23-3729.

Microbee: Four-reel poker machine; play it at home, but don't lose your money. Also a bonus copy of Battleships absolutely free when you purchase the poker machine. Just $9.95 plus $1.00 postage. Send your mail order to David Peters, 190 Bourke Road, Umina 2257. Guarantee prompt delivery.

Dick Smith GP100 Dot Matrix Printer: New and unused. Still boxed. $350 ono. Phone (047) 39-3838.

VZ200 Program: Metriconversion VZA. Type in the category, length, density, pressure, etc. and the computer lists your options, accepts your number, converts it and displays your answer. Only $9.90 from M Perkins, 8 Lavender Street, Kyneton 3444.

Com-64 Cartridge: Rabbit, fast cassette loader, etc. Sell $100. Phone (070) 56-5215. Box 309, Gordonvale 4865.

For Sale: Tandy TRS-80 Model 1 with 48K, numeric keypad, green screen, dual disk drives, dot matrix printer. Software includes VisiCalc, Visigraph, Lazywriter Word Processor, Maxi-Manager Data Base, assembler and editor, TRSDOS and NEWDOS/80. Games, tapes, all texts, manuals and more. $3150.00. Phone (07) 378-6087.

Wanted: Games, programs for TRS-80 4K model, suitable for 10-year-old boy. Contact Len Mumme, 3 Ludwig Place, Duncraig 6023 or phone (09) 448-6524.

Brisbane 'PC1500 Bit Fiddlers Club': Meets 7.30 pm every third Thursday at Kelvin Grove BCAE, Room E/315. All owners of PC1500/PC2 as well as owners of other handheld computers are welcome. Phone Chris (07) 395-1952 ah.

PC-1500/PC-2 Assembler and Disassembler package: On cassette, in BASIC, Sharp's mnemonics. Requires 8K RAM. $7 inc P&P. M Tischler, 390 Upper Roma Street, Brisbane 4000.

VIC-20: Plus C2N-cassette plus heaps of software, including Blitz, Invaders, Frogger, Amok, adventure games etc. Plus two cartridges – $400 for the lot. Phone (02) 89-5871.

Apple Compatible: 48K, $585, disk drive, slimline, $330; 12" Hi-Res amber monitor, $185, all new with books and warranty. (02) 969-1185.

Commodore VIC-20 Computer: Excellent condition, still in box, bargain at $240. Ph (08) 31-0310 after 5 pm. Mr Begg.

The ACT VIC-20 Users' Association: Meets on the first Monday of each month at the Boys' Grammar Scout Hall, Red Hill, from 7.30 pm onwards. The Association also publishes the bi-monthly magazine 'VIC' full of programs, tips, reviews etc. and is available from the Association for $1.50 a copy or $8.00 per year. Write to Chris Groenhout, 25 Kerferd Street, Watson ACT 2602, (062) 41-2316, for more information or to secure your copy of the December 'VIC'.

VZ200 Computer: Space Shot, Moonlander Simulator, contact Scott Jacobson, 4 Leichhardt Street, Toowoomba 4350. Include $7.00 for cassette and postage.

Info Needed: How to fine scroll VIC-20 defined graphics. Preferably a formula. Write 90 Bathurst Road, Orange, or phone (063) 62-4906.

Apple II+ 48K or IIe games: Round The Square, Matches, Tower of Hanoi. All for $15.00. 9 Rowbotham Street, Toowoomba 4350.

Commodore 64 Software: Alarm clock, Diamonds, Integer Game, Maze, Patterns, Rallycross. All six programs on cassette $12.50, disk $16.00. David Johnson, 2/13A Aberfeldy Avenue, Edwardstown 5039. (08) 297-8147.

System 80: Blue Label 16K with 50 programs. All for $400 ono. Ph (002) 28-5772.

Microbee Quality Software: 'Text Editor' has all the necessary composition aids for business and personal letter and report writing. Suitable to any MicroWorld BASIC compatible printer. Instructions, tape, postage, $15.00. Mail order to B Proctor, 27 Roberts Avenue, Mortdale 2223. Prompt return guaranteed.

Microbee Quality Software: 'Decoder and Listing Formatter' displays a BASIC listing complete with embedded machine code and 'unprintable' characters in translatable form. Now find out why your screen went blank, or refused to list. Allows you to extract suitable m/c routines for use in your own BASIC programs. Good teaching aid for m/c learners. Contains printer routine for neat, unabridged program listings. Instructions, tape, postage, $15.00. Mail order to B Proctor, 27 Roberts Avenue, Mortdale 2223. Prompt return guaranteed.

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Osborne I: DD, Centronics printer, 132 column, books on BASIC and CP/M. All offers considered (049) 61-2731.

For Sale: Atari TV game with nine cartridges, A-1 condition. Worth over $450, sell $220. Phone (02) 560-9322.

TRS-80: 40-track disk drive with cable. As new. $300. Phone R Griffiths on (02) 236-2042.

VZ200: Four great game programs on cassette. E.g. Galazian, Lunar Rescue, $35.00 incl p&p. Phone 703-1071 (*no area code given*) around 5.00 pm.

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A Gift VZ200 Offer: Eight program cassette pack. Save, now only $20.00 or $28.00 with machine cover, post free. Send to Alf's Software, 39 Reading Ave, Kings Langly 2147.

IBM PC: Monochrome display and printer adaptor card with IBM display, $1000. IBM printer with heavy duty cable, $850. 2 x 160K drives, $300 each. All items as new (printer never used). (02) 502-2982 (bh), (02) 76-8414 (ah).

VIC 20 Computer: Excellent condition, hardly used. Includes all connecting cables. A bargain price. $250. (08) 31-0310 ah.

A Simple Word Processor: For TRS-80/System 80. $30.00 ($40.00 including source code). Requires at least one disk. P Klemencic, 21 Bayswater Road, Moonah 7009. ❑

your MICROBEE corner

By Richard Pakalnis

HELLO AND welcome. Just a quickie this month, as I'm presently redecorating and I'm up to my eyeballs in paint 'n' paper. I asked my old chum Mike Newnham to review Robotron's new music maker for you, and I'm very pleased to announce that in February 1984 Mike will be conducting courses in Z-80 assembly language programming in Sydney's western districts (St. Mary's and Parramatta).

All aspects of Z-80 programming and applications are to be covered in two six-week units designed to suit both beginners and those who are more advanced in Z-80. Attendance will be on a one night per week basis, and the cost for each six week course will be $60.

Interested? Then call Mike Newnham after hours on (047) 21-5417 and have a chat about it.

Mytek Competition Results

You may or may not have been aware that Mytek recently had a software competition, and to show you that people do actually win, here are the winners!

First prize went to Nick Martin of Vic Park WA, whose entry of 'Chopper' won him $500. ($500! Holy Reset. I think I'll take up programming. Now where's that manual ...?)

Five further prizes of $100 each went to:

J. Durham, Upper Hutt, New Zealand
A. Wilkins, Marrickville, NSW
R. Kermonde, Maffra, Vic.
S. Tennant, Nedlands, WA.
D. Faulkner, Salisbury Heights, SA.

The competition was such a success that Mytek has decided to run another; details will be announced in the next catalogue, and watch their ads in this magazine. By the way, a consolation prize game of 'Defender' was sent to each of the many entries.

Word Processor Give Away

Dreamcards, the Melbourne-based software distributor, is handing out free listings of its mini word processor program for the MicroBee with all sales of its software during the month of December. This offer is for readers of *Your Computer* and *Electronics Today International* (our sister publication), and is being made to celebrate Dreamcards' expansion from 'Mail Order Only' to the recent appointment of a number of dealers.

Rush in and see:
Jaycar (all stores)
Computer Technics (Sydney)
Coastal Computers (Gorokan)
Comput/Ed (Coffs Harbour)
Computerland (South Melb.)
Magraths (Melb.)
Computech (Belconnen)
MicroBee Comp. (Canberra)
Altronics (Perth)
Pine Street Trading (Tom Price)
Software 80 (Brisbane)
Town & Country (Townsville)
Quantum Computers (Hobart)

At Last – A Voice For The Bee

Yes, it's finally ready. A voice for the Bee from those people at Robotron and Milan Hudecek.

I've since sent on the unit to Mike Newnham to review (I only got to see it for two days). Let me state here and now that I think this will be the best value for money add-on for your Bee. It's great and I can't wait to get it back – hurry up, Mike!

Watch for the review in the very near future (January?).

Tips And Tricks

Colin Fountain of Dalby, Qld. sent in a few tips and tricks and a typing tutor program. The program we've kept for our Pocket Programs Liftout but I'm using his tips in the column as they're of wide interest. Thank you, Colin, over to you.

Here are a few tricks I have picked up while using the MicroBee, which are not immediately obvious in the user manuals or in some cases are not shown at all.

Firstly, I will deal with Microworld BASIC. When using a FOR, NEXT loop, the maximum count that can be made is 32768 or 2~5. This, no doubt, is because of the 16-bit integer operation. If more than these are required then consecutive FOR, NEXT loops must be used.

When sending data to and from cassette or other devices using the IN# and OUT# commands, the data format must look exactly like the keyboard-VDU set-up. This means that when more than one piece of information is sent out, it must include ","'S between each, and a carriage return at the end (done by a CHR(13)). If not, when reading that information back in string format, it will appear as one string rather than a group of strings.

An example could best explain this. To send information to cassette use: OUT2#: PRINT1$,",",S2$; CHR(13): OUT#0. To get back, use: IN#2: INPUT1$; S2$:IN#0

For those who don't know how to use the PCG, this is how it is done. The starting address of the data used to make up a particular character can be found by the equation:

63488 + 16*(character code-128),

where (character code) can be an integer from 128 to 255. Each character is made up of 16 bytes representing the rows of pixels making up the character. Each bit making up the byte represents a corresponding pixel in the row. The bytes representing the rows from top to bottom are put into memory starting at the address calculated earlier.

To use the character do a PRINTCHR(character code) or use the PCG command, which effectively switches the character ROM to the PCG RAM, thus allowing the character to be displayed rather than the ASCII character with code (character code-128) when that particular key is entered from the keyboard.

For those with the editor/assembler ROMs, I have discovered a couple of interesting features of the MicroBee monitor which are not mentioned in the manual.

First, there is a command (A nnnn) which is used to insert hex bytes directly into memory. It has the same cursor controls as the (E nnnn) command. To leave the (A nnnn) and (E nnnn) format, just hit the [ESC] key.

In order to leave the monitor and return to the editor, simply enter the command (X).

Entering the command (V) will set up the MicroBee as a glass typewriter. It also allows the display for the monitor to be shifted about as in BASIC, which otherwise is not possible from the monitor. To leave the glass typewriter, type [RESET] or [RPT].

Auld Lang Syne

Just before I pass you over to Mike, I want to wish you all a very Merry Christmas, and may 1984 bring you all you wish for. A big thank you to the readers – no, participants – in this column. You make it happen. If you copy a routine or buy a program because it was mentioned here, then you have participated. A big thank you to those who have unselfishly given literally hours of programming work just so they could share their knowledge with others.

See you in 1984. Ciao.

Software/Hardware Review

Product: BeeThoven (hardware); BeeComposer (software).

Supplier: Robotron Pty Ltd.
Reviewer: Mike Newnham.

No doubt all users of the MicroBee are familiar with the capabilities of its tone generator. It produces a series of beeps and pops that resemble tunes and, using machine code routines, it can be made to generate quite unusual and effective sound effects. The recent articles in *Your Computer* magazine (June/July 1983) provided some good routines to this end.

Milan Hudecek of Robotron, a Melbourne-based firm, was the source of those articles. He is now marketing a piece of hardware called 'BeeThoven', which plugs into the MicroBee parallel port and takes sound synthesis on the Bee a few steps further.

Also available from Robotron is a program called 'BeeComposer', which is a machine code music composition program for use with BeeThoven.

The main elements of BeeThoven consist of three tone generators, one noise source and three noise/tone mixers. The frequency of each tone generator is independently programmable over a wide range. Noise may be mixed with each of the tone sources, and a programmable envelope generator is provided for amplitude modulation of each voice for functions such as attack and decay and programmable volume control.

All these features combine to permit the creation of a wide range of sound effects and musical notes. BeeThoven is supplied with a demonstration tape giving some idea of its capabilities. After using BeeThoven for a time, I believe there are not many sounds it can't reproduce.

A software driver which allows your programs to control BeeThoven is also provided on the demo tape. All commands to control sound generation are passed to BeeThoven via this driver.

There are also two DB-9 plugs mounted in the case. These plugs permit the direct attachment of either Atari or VIC-20 joysticks. The BeeThoven driver is used in this instance to read the ports and return the joystick position values to the calling program. I found that running under BASIC the response is a little slow. This is no fault on the part of BeeThoven, but is due to the impracticality of using BASIC for real-time applications. Under machine code the performance was excellent, the only controlling factor being the efficiency of program coding.

The documentation supplied with BeeThoven is first class. It is presented in a spiral-bound booklet which leaves nothing out; each command is fully explained as to its function and use. There is a program on the demonstration tape called 'Tutor'. This is used in conjunction with the manual to guide the user through the commands and explore the operation of each. The manual contains a table which specifies the data values required to generate each note of the tempered musical scale, and there are both BASIC and Assembler source listings of routines to generate various sounds.

While BeeThoven is not physically large, its size belies its abilities. It is a most impressive device. BeeThoven, demonstration tape and manuals together sell for $89.50.

For an extra investment of $29.50 you can purchase BeeComposer, which transforms 'impressive' into 'very impressive'.

BeeComposer is a machine code program which enables the user to create, transcribe and edit musical compositions, and immediately play them on BeeThoven. It supports all standard musical notation and provides for the selection of key signature, time signature and tempo. You can compose in three parts, or voices, and save all your compositions to tape for later playing or editing.

After loading, BeeComposer signs on with its own fanfare, then displays the great staff and below it the lower bass staff. Music is entered onto the staves by means of simple keystrokes. Cursor control makes the tasks of composition and editing very easy indeed. BeeComposer makes very good use of the MicroBee's high-resolution graphics and all characters are clearly recognisable as the musical elements they are designed to represent.

On the 'flipside' of the BeeComposer cassette, a demonstration composition is provided. This is loaded in via BeeComposer and, when played, is a perfect example of the magic of the BeeThoven-BeeComposer symbiosis.

One observation made by a number of people who have seen and heard this package in operation is that it has real potential as a means of teaching music. The user is able to write a piece and play it immediately. He or she may then edit the composition, replay it, and demonstrate instantly the behaviour of each individual element of a piece of music. Some students of music may find that the replacement of pencil and music book with keyboard and screen is a very enjoyable change.

One thing I discovered is that experimenting with BeeThoven and BeeComposer becomes almost as addictive as programming itself. Programming sessions that last until 5 am have revealed some very talented home programmers. Perhaps this offering from Robotron will awaken latent musical talents in some of them too.

Again, the manual supplied with BeeComposer is first class in both quality and presentation. It clearly explains the operation of every command used by BeeComposer, and provides a description of the use and function of each component of music notation.

To sum up, BeeThoven is certainly a worthwhile addition to your system. If you do intend purchasing it, then I would recommend that you also buy BeeComposer, especially if you have a musical bent.

If Robotron maintains this standard of quality, we should see some excellent products from the company in the future. ❑

Product Review Summary

Product:	BeeThoven	BeeComposer	Combined Package
Ratings:			
Ease of use:	Very good	Excellent	Excellent
Entertainment:	Good		Excellent
Educational:	Fair		Excellent
Documentation:	Excellent	Excellent	
Use of graphics:		Very good	
Value for money:	Very good	Excellent	Excellent
Holds interest:	Yes		Addictive
Price:	$89.50	$29.50	$119.00

Review unit from: Robotron Pty Ltd. PO Box 232. Mooroolbark 3138

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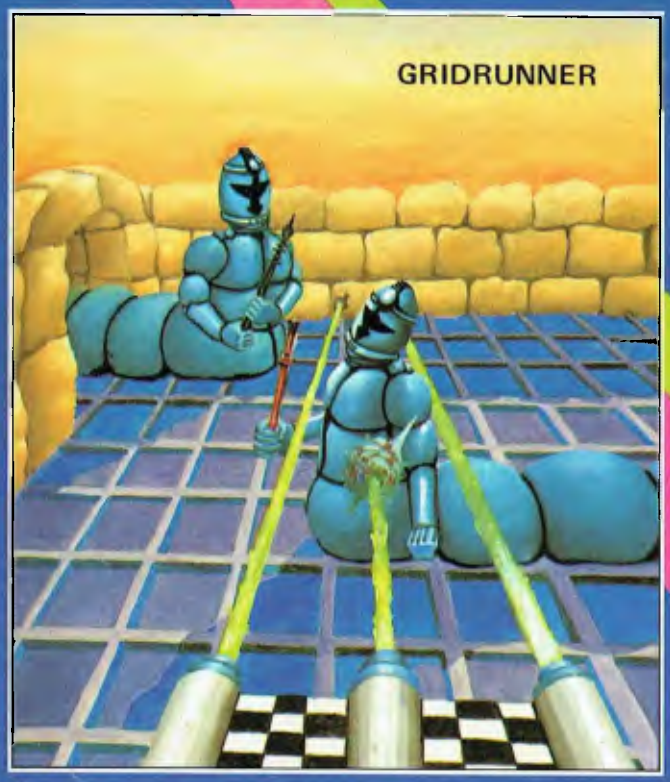

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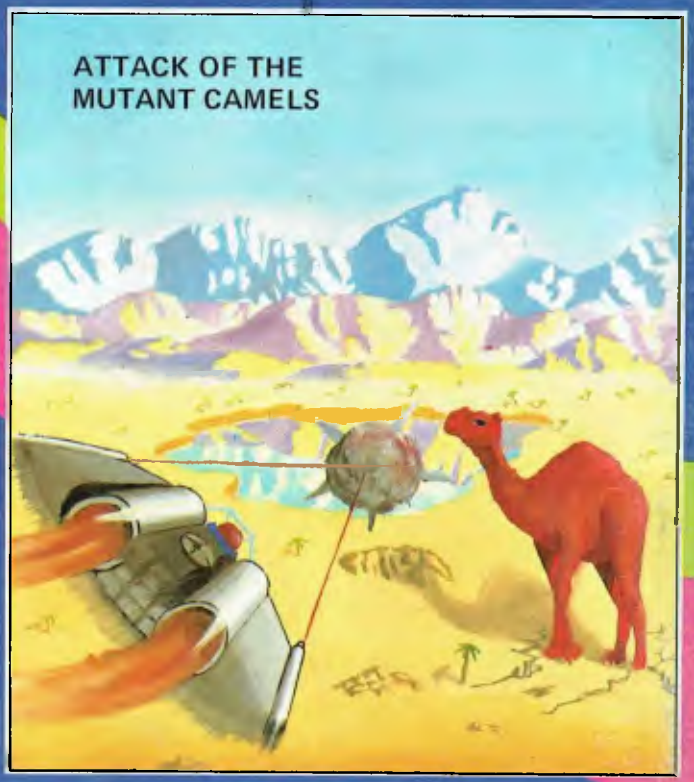

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